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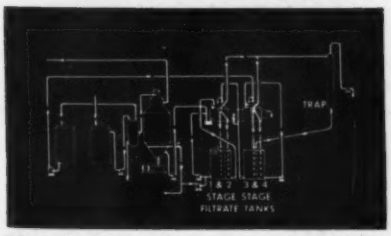
Paper TRADE JOURNAL

REG. U. S. PAT. OFF.

VOLUME 126, No. 5 JANUARY 29, 1948

Three-drum five-stage Swenson-Nyman Pulp Washing System in operation on Kraft board pulp.

Close-up showing sheet formation and liquor shower arrangement on middle drum of same installation.



Flow sheet of 2-drum, 4-stage installation

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The Swenson-Nyman Pulp Washer, now in operation in many leading pulp mills, is bringing substantial economies in both chemicals and fuel. Closed system eliminates spillage and low dilution, reduces the evaporator load, and hence steam requirements.

Today's trend is toward an increasing number of washing stages, with repulping between drums. Each drum of the Swenson-Nyman Pulp Washer provides 2-stage washing. Four, five, and six stages of washing are practical. Fully described in Bulletin F-104... free on request.

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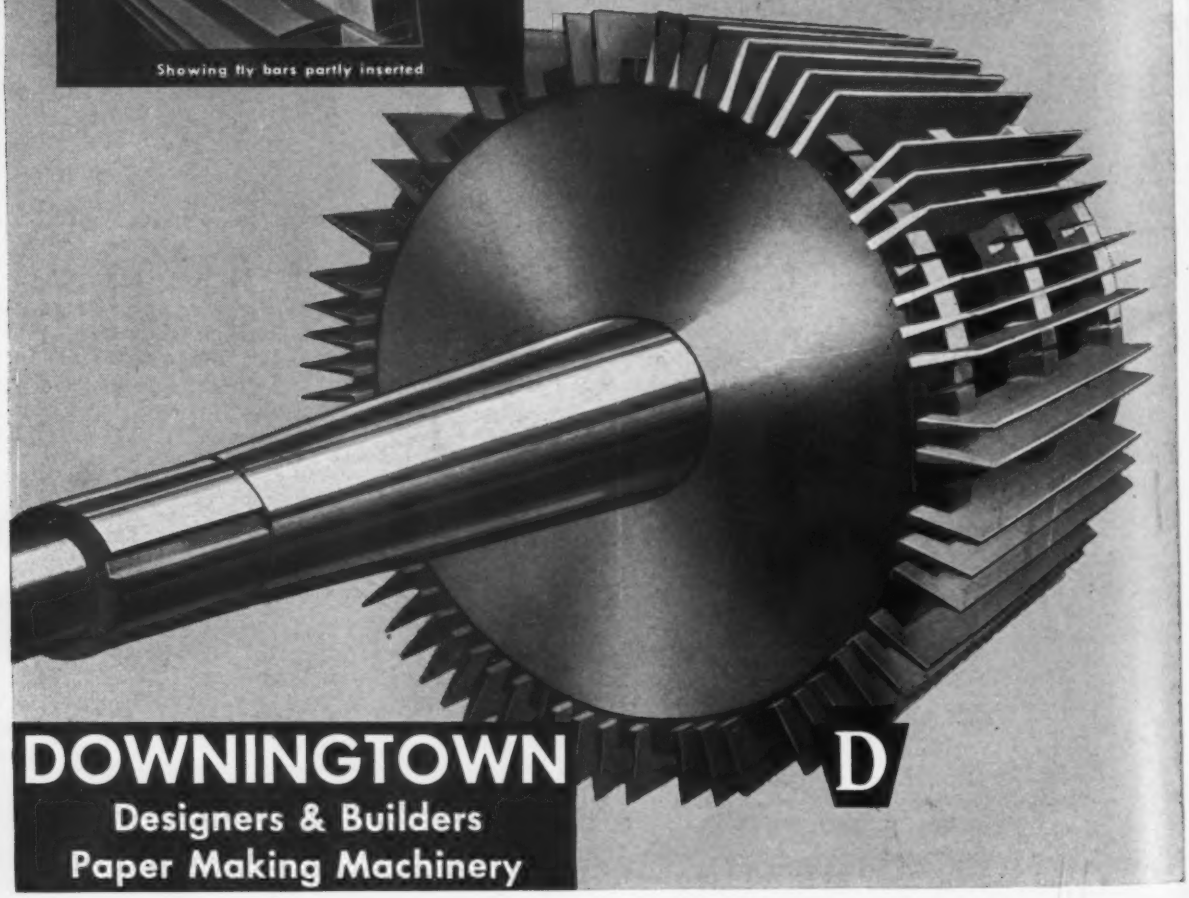
Showing fly bars partly inserted

Rag stock has been the downfall of many a beater roll, but for Downingtown Bandless Rolls, it has merely served to show how good they are. In one mill alone, over a period of years, Downingtown Bandless Rolls have prepared the rags for well over a million tons of felt, and this was in the days when felt was mostly rags. That's a lot of tough chewing. Moral: With "easier to beat" fibers, Downingtown Bandless Rolls last and last and last. Close to 500 of these rolls have been installed in mills making all kinds of paper. Of course they can be put in any beater, yes, even built on your old shafts. If you want to put in a roll you can forget for a long, long time, write us.

DOWNINGTOWN MFG. CO., DOWNINGTOWN, PA.



DOWNINGTOWN **D**

Designers & Builders
Paper Making Machinery

IN THIS ISSUE

JANUARY 29, 1948

Sets Year's Output At 21 Million Tons	7
Senator Wiley Protests Ontario Pulpwood Policy	7
Harry Kinne Takes On Wisconsin Wire Line	8
Riegel Names Two To New Executive Posts	8
Marathon Re-elects Its Officer Slate	9
Paper Week Program Shows Full Schedule	9
Tissue Groups Plan Paper Week Program	10
Waxed Paper Group To Meet February 25	10
FINANCE	12
Kalamazoo To Stage Session On Coatings	14
Commission Insists On Tree Protection	14
Trees For Tomorrow Starts New Contest	14
Weldment Contractors Set Up Trade Group	18
Waste Dealers Ready Convention Plans	18
Garrett-Buchanan Sets Up Pensions	22
OBITUARY	24
EQUIPMENT AND SUPPLY NEWS	25
NEW LITERATURE	27
IMPORTS	28
TRENDS	29
PRICES	30
MARKETS	31
PRODUCTION RATIO REPORT	32
EDITORIAL	33
CLASSIFIED ADVERTISING	50

Technical Section ("TAPPI")

Index, Technical Section, Paper Trade Journal, Volume 125, July to December, 1947	35
Chemical Uses of Sulphate Turpentine	39
The Butyric Acid Fermentation of Sulphite Waste Liquor	43

INDEX TO ADVERTISERS ON PAGE 66

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CALENDAR OF COMING EVENTS

January 28-30—Technical Section, Canadian Pulp and Paper Association, Annual Meeting, Mount Royal Hotel, Montreal, P. Q.

February 22-27—American Paper & Pulp Association, Annual Convention. The Waldorf Astoria, New York. N. Y.

February 23-26, 1948—Technical Association of the Pulp and Paper Industry, Annual Meeting, Hotel Commodore, New York City.

May 18-20, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

June 11-12, 1948—Paper & Twine Association, Annual Convention, French Lick Springs, Indiana.

CENTENNIAL SPOTLIGHT
1848-1948

In this 100th anniversary year as Machine Builders for the Paper Industry, Puseyjones points with pride to outstanding post-war installations. In the spotlight . . . 245" Fourdrinier Machine built for: The Champion Paper and Fibre Company, Canton, N. C.

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(NEWS ITEM: *Paper tissues impregnated with soap are a recent development for today's travellers.*)

Workers and travellers have found a new, easy way to carry soap with them. Paper tissues, in convenient purse-size booklets, are impregnated with soap. The user wets hands, wets one soap tissue thoroughly, and uses as an ordinary cake of soap. The used tissue is easily disposed of in a waste receptacle. Remaining soap sheets can be returned immediately to suitcase or purse with no danger of damaged fabrics. We will supply manufacturer's name on request.

Paper to polish silver . . . paper bags to package ice . . . paper cords for washday . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities —new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines. Additional capacity in Metals Fabrication is now available through conversion of facilities formerly devoted to the building of ships.

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Paper TRADE JOURNAL

VOL. 126, NO. 5 REG. U.S. PAT. OFF. JANUARY 29, 1948

Sets Year's Output At 21 Million Tons

WASHINGTON—Production of paper, paperboard, wet machine board and building board appear to have set a new all-time record of 21,028,898 tons in 1947, according to a report issued today by the Bureau of the Census, Department of Commerce. The 1947 record is 1,751,231 tons or 9.1 percent greater than the 1946 record, the previous all-time figure. These data are preliminary and subject to correction when the results of the forthcoming complete Census of Manufactures becomes available.

The output of paper reached 10,634,481 tons in 1947, an 846,988-ton increase over 1946. The increase in paperboard from 8,396,233 tons in 1946 to 9,043,824 tons in 1947 was substantial but less percentage wise than the advance in paper. The 257,992 ton increase in building board amounted to 27 percent, the largest increase in any major group.

The unequaled production rate in 1947 was attained by full operation of existing equipment and by the start up of new capacity which was installed during the year. The availability of fibrous materials was generally adequate in all categories excepting wood pulp. During the early months of the year, a number of mills dependent upon wood pulp from overseas sources were unable to obtain their full requirements.

In the paper field, newsprint at 816,151 tons in 1947 was 43,354 tons more than in 1946. Other printing and fine paper output increased 9.8 percent over 1946, and coarse papers 8.0 percent. The increases in sanitary and absorbent paper were the least in percentages in the paper grade group.

Output in 1947 was substantially greater in all grades of paperboard, with liners and miscellaneous boards leading in percentages. The production of folding box boards and cardboard was less in 1947 than in 1946.

Pulpwood Cut Higher—May Curtail Operations

TORONTO, Ont.—Canada's pulpwood cut so far in 1947 was reported to be 127 percent of 1946 during the same period. On this basis, the 1947-48 cut could run as high as 12 million cords providing, of course, that operations were maintained at the same levels. It was reported, however, that some companies reduced woods operation towards the end of 1947 and will continue to do so for a few months into 1948. Since most companies are ahead of schedule some cutback may be possible during the poor cutting months.

Improvement in the pulpwood supply is the direct result of the larger working force. Approximately 3,000 displaced persons have gone to the woods and more are expected before the end of the year. The improved working force in the woods may result in some displaced persons being funnelled to the mines.

Senator Wiley Protests Ontario Pulpwood Policy

APPLETON, Wis.—A recent protest by U. S. Senator Alexander Wiley of Wisconsin to Premier George Drew of the province of Ontario, Canada, brought to public attention a situation which has been known to paper mill operators for a long time. Senator Wiley protested against the sharp curtailment of pulpwood cut for export on crown lands in the province.

Wiley said he had received letters and telegrams of protest from Wisconsin pulp and paper executives. One of these said:

"Practically every mill that makes pulp in the state has been to a large extent dependent upon Ontario for its supply of wood for many years in the past.

"Should our paper company be prohibited from importing wood from Ontario, where we have invested $750,000 in logging equipment and camps, you can readily see the loss that we would sustain.

"Furthermore, such a move would necessitate this company to shut down its pulp mill here and throw hundreds of people out of work. This same situation is true with a good many pulp mills in the state."

Mills have been advised that export of Ontario pulpwood to firms which do not have plants in that province will end in three years. In the meantime, quotas have been cut to about 50 percent of the 1942-46 average for the next three years, on a sliding scale decreasing each year. Companies with Ontario plants have a ten-year grace period.

Because last year's cut was exceptionally heavy due to favorable weather and more available labor, the restriction is not expected to affect mill operations in this area immediately. However, several firms have suspended their woods operations in Ontario. Some already have cut more pulpwood than their entire three-year allotment under the restricted quota, it is reported, and have it stacked to await spring shipment.

The restriction applies only to spruce, jackpine and balsam cut on crown lands in Ontario. It does not apply to popple, hemlock and birch, or to wood

(Continued on page 22)

Newspapers Understood to Seek Hawley Mill

PORTLAND, Ore.—Three West Coast newspapers are said to be negotiating for the purchase of the Hawley Pulp & Paper Company at Oregon City. They are the Los Angeles Times, Portland Oregonian and Oregon Journal.

In a statement in Los Angeles, publisher Norman Chandler of the Los Angeles Times revealed that negotiations have been in progress for two months. He said, "the three papers have been, and still are, in conference with representatives of Blyth & Co., which is acting as agent of the principal stockholder, but as yet terms of the purchase have not been agreed agreed upon."

Hore-Belisha Raps Newsprint Cuts

OTTAWA, Ont.—From London, Eng., comes word that Leslie Hore-Belisha, former Conservative cabinet minister, charged the Laborite government had increased its own paper consumption 77 percent while cutting that of newspapers and periodicals by 70 percent of pre-war figures.

Addressing a protest meeting in London on the effects of newsprint cuts, Hore-Belisha said, "To expect an electorate deprived of adequate newspapers to reach a fair judgment in issues which affect national life is like asking a jury to give a verdict without a full disclosure of the facts."

Harry Kinne Takes on Wisconsin Wire Line

WATERTOWN, N.Y.—Harry C. Kinne, former vice-president and sales manager of the Bagley & Sewall Company of this city, has been made sales agent of the Wisconsin Wire Works of Appleton, Wis., and will have the eastern section of the United States as his territory.

Mr. Kinne, who was connected for 41 years with the Bagley & Sewall Company, manufacturers of paper and pulp mill machinery will begin his duties immediately with the Wisconsin company, which has a record of more than half a century for manufacture of both bronze and brass woven wires used on both Fourdrinier and cylinder papermaking machines. He will travel extensively through his territory, the states of New York, Massachusetts, Connecticut, Virginia, West Virginia, Pennsylvania, Delaware, Maryland and part of New Jersey. He succeeds the late Fred J. Rooney, who represented the Wisconsin Wire Works for years and who prior to that was superintendent of the Upson Board Company at Lockport, N. Y.

Mr. Kinne retired as vice-president and salesmanager of Bagley & Sewall at the end of November, 1939, when his brother, Clarence E. Kinne, was president of the company. He was given a testimonial dinner by the company.

Brush Joins Brown As Controller

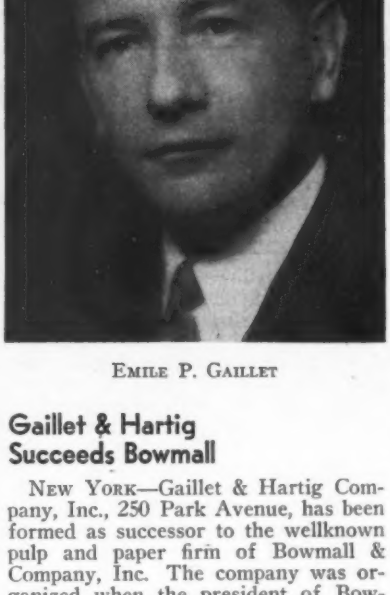
BERLIN, N. H. — Howard G. Brush of Grosse Point, Mich., former vice-president and treasurer of Motor Products Corporation, Detroit, has been elected Controller of Brown Company, and of its Canadian subsidiary, Brown Corporation, manufacturers of paper and pulp and allied products.

Mr. Brush has been engaged in accounting and finance during the last 20 years. He served with Ernst and Ernst and with Price, Waterhouse and Company before joining Motor Products Corporation in 1942.

Putnam Heads Drive For Pioneer Valley

SPRINGFIELD, Mass.—Stating that he knows of no investment that can bring larger returns than membership in the Pioneer Valley Association, Roger L. Putnam, chairman of the board of Package Machinery Company, has declared that he will head a committee of 75 businessmen for the Association's annual membership drive.

"Almost everyone in our city benefits from a healthy tourist business," Mr. Putnam remarked, "but we won't have this business unless we go after it. And that means continuing the year-around advertising of our attractions."



EMILE P. GAILLET

Gaillet & Hartig Succeeds Bowmall

NEW YORK—Gaillet & Hartig Company, Inc., 250 Park Avenue, has been formed as successor to the wellknown pulp and paper firm of Bowmall & Company, Inc. The company was organized when the president of Bowmall & Company, Inc., L. W. Bowmall, was elected executive vice-president of one of the largest pulp firms in New York, in September, 1947.

President of the new firm is Emile P. Gaillet, a former vice-president of Bowmall & Company, Inc., and until 1945 the director general of the Groupement d'Importation de la Papeterie, Paris. Vice-president is Charles R. A. Hartig, also a former vice-president of Bowmall & Company, Inc., and until 1940 a director of the Anglo-American Pulp & Paper Company, Ltd., London.

Other members of the team are F. S. Warren, treasurer, and Fred W. Cassirer, secretary and manager of the Paper Division. Gaillet & Hartig Company, Inc., is acting as agent for several foreign and domestic manufacturers of pulp, paper, Fourdrinier wires and felts and also representing leading American makers of pulp and papermill equipment on foreign markets.

Church Council Again Elects Shattuck Leader

MADISON, Wis.—S. F. Shattuck, retired vice president of Kimberly-Clark Corporation, on January 20 was re-elected president of the Wisconsin Council of Churches, continuing in the office to which he was elected after the death of Bishop Schuyler E. Garth in a plane accident in China last year. He is the first layman to head the council which is made up of representatives of 10 Protestant denominations.

Riegel Names Two to New Executive Posts

NEW YORK—Riegel Paper Corporation has named Ward Harrison as assistant to the executive vice-president and general manager, and F. S. Leinbach as assistant to the vice-president and general sales manager. Both appointments were effective January 19.

Mr. Harrison will be in charge of the company's Southern operations. He will be directly responsible to Walker Hamilton, executive vice-president. Mr. Leinbach will work with A. P. Mitchell, who is the company's vice-president and general sales manager.

At the present time Riegel's Southern operations consist of 140,000 acres of timberlands near Acme, N. C. This tract was purchased by the company in 1937. Eventually the company would like to construct a pulp mill on this site to provide at least a portion of its own requirements in addition to pulp purchased from others under long term contract and in the open market.

Mr. Harrison has been with Ecusta Paper Corporation, Pisgah Forest, N. C., since 1941. Prior to that time he was with Riegel for five years. He is a graduate of Iowa State College, Ames, Ia., and holds a Ph.D. degree from the Institute of Paper Chemistry, Appleton, Wis. He is a member of TAPPI, American Pulp and Paper Mill Superintendents Association, and American Institute of Chemical Engineers.

After receiving his doctorate from the Institute in 1936, Mr. Harrison joined Riegel as a laboratory technician and became a plant chemist. He left Riegel to go with Ecusta in 1941 as a process engineer. He became assistant general manager in 1944. He has a thorough knowledge of Riegel's pulp requirements and production processes. Through his past experience he knows the operating phases of pulp processing as well as mill management.

Mr. Leinbach has been with Riegel since 1934. A graduate of Lafayette College in 1931 with the degree of Bachelor of Science in Chemical Engineering, he taught science at the Swavely School in Manassas, Va., for three years before joining the company. He started in laboratory work and was a plant chemist in the coating department. He became a sales engineer in 1942.

During the war, Mr. Leinbach was loaned to the War Production Board as a dollar a year man. He served as assistant director of the containers division of WPB for a year and a half.

Upon his return from Washington in 1945, Mr. Leinbach served as an assistant to the general manager until his present appointment.

Mr. Leinbach is a member of the American Chemical Society and the Chemists Club of New York.

Marathon Re-elects Its Officer Slate

WAUSAU, Wis.—Marathon Corporation's directors and officers were re-elected at annual meetings January 19 at its offices in the Rothschild mill.

A dividend of 25 cents a share on common stock, subject to a 2.5 percent deduction for Wisconsin privileges dividend tax, was declared, payable February 20 to stockholders of record January 31. The preferred stock dividend will be $1.25 a share, after deduction of the Wisconsin tax, payable April 1, to stockholders of record March 20, 1948.

Directors reelected were Allen Abrams, J. S. Alexander, Lester Armour, Chicago; Leo E. Croy, Menasha; L. F. V. Drake, New York City; D. C. Everest, C. S. Gilbert, M. P. McCullough, Chicago; John Stevens, Jr., C. J. Winton, Minneapolis, and A. P. Woodson.

The following officers were reelected: Everest, president; Croy, executive vice-president; Stevens, Abrams and R. J. Sund, Menasha, vice-presidents; A. M. Van Douser, secretary-treasurer; R. M. Altman, assistant secretary-treasurer, and Maynard T. Reierson, Menasha, assistant secretary.

Referring to the annual statement, which was released December 18, Everest told the stockholders that the net profit for the year ending October 31, 1947, were $4,654,457 and the sales aggregated $44,604,332.

St. Regis to Distribute 882 Service Pins

WATERTOWN, N. Y.—A total of 882 St. Regis Paper Company employes in ten Northern New York mills and plants will receive newly designed pins denoting five years or more of service with the company, C. C. Wenzel, Deferiet, personnel manager of all mills in the north country, made known this week. The pins will be distributed by plant superintendents and managers during working hours.

At the Deferiet mill, birthplace of the company almost half a century ago, 135 gold pins, recognizing 25 years of service or more, will be awarded, the largest number of gold awards for any of the company's units. Of Deferiet's 800 employes, 193 will receive pins symbolizing five years of service or longer.

St. Lawrence Plan Taken to Court

MONTREAL, Que.—A small group of St. Lawrence Corporation shareholders will air their grievances in court shortly over the recently approved reorganization plan.

Following the approval of the Corporation plan by the majority of common and preferred shareholders, the dissident group appeared in Superior Court with a request to have the matter reopened. It is said that one of the group is a United States shareholder. An Ontario shareholder has also come out strongly against the plan but is not one of the group which has petitioned the court, it is stated.

According to the voting record, the Corporation plan was approved by 1,362 shareholders voting 165,000 class "A" preferred shares and 1,119 shareholders voting 387,613 shares. Against the plan were 18 shareholders representing 5,000 class "A" preferred and two shareholders representing 1,000 common shares.

Bartsch Says Rayonier Made More in 1947

NEW YORK — Directors of Rayonier Incorporated, producer of highly purified wood cellulose, on January 21 declared a first quarter dividend of 25 cents per share on the company's common stock, payable February 16, 1948, to stockholders of record January 30. President Edward Bartsch said that the company's earnings in 1947 were substantially higher than in 1946. He indicated that a large share of the profits would be utilized in connection with the recent acquisition of the Polson Logging Company, and in servicing the $20 million debt incurred at the time. He also mentioned that part of the earnings will be used for further capital expenditures necessary to keep pace with customers' demands for Rayonier products.

Gypsum Pays Tribute To Its Gold Stars

BUFFALO, N. Y. — Top executives and plant managers of the National Gypsum Company paid tribute to the company's 23 employes who were killed in action during World War II. A plaque, dedicated to the Gold Star heroes, was unveiled in the company's headquarters at 325 Delaware Ave.

This was one of the highlights of the annual meeting here of the company's 25 plant managers from throughout the country. The meeting, during which production problems were aired, was held for an entire week in the home office.

At a banquet in Hotel Statler, the plant managers and executives honored Gordon H. Tarbell, who recently relinquished his active duties as vice-president in charge of production. Mr. Tarbell, one of the company's founders, continues as a director and in an advisory capacity.

Wortendyke Elects

RICHMOND, Va. — Eugene B. Luck, vice-president, has been elected a member of the board of directors of the Wortendyke Manufacturing Company. J. Rucker Ryland has been elected a vice-president and A. L. Waldrop, secretary, has been elected secretary and treasurer.

Paper Week Program Shows Full Schedule

NEW YORK—Its plans for a broadly interesting program well advanced the American Paper and Pulp Association this week gave out details of the meetings that will pack more than five days full of information for those who attend the 71st annual convention of the Association. As has been told before, this convention will see the annual dinner restored to the list of events. It will be held on Thursday evening in the Grand Ball Room of the Waldorf-Astoria. Most of the committee and associated industries meetings also will be held at the Waldorf. The big annual convention of the Technical Association of the Pulp and Paper Industry, as is customary, will center around the Commodore.

In its speaker for the annual banquet the APPA has secured a notable figure. He is John Hancock of Lehman Brothers. His subject will be "International Control of Atomic Energy." Retiring President Reuben Robertson also will talk at this dinner.

All registration will be centered around the fourth floor, as usual. An added feature this year will be the presence of Languild Convention Service, also at the convention desk. This service is available for information regarding amusements, and will help secure tickets. It also will act as a shopping guide. Its assistance is available at a moderate fee.

The program follows:

SUNDAY, FEBRUARY 22—*The Tissue Association, Inc.*—2:00 p.m. Finance and Rate Committee, Secretary's Suite; 5:00 p.m. Board of Directors and Business Meeting, Carpenter Suite; 7:00 p.m. Board of Directors' Dinner, Carpenter Suite.

MONDAY, FEBRUARY 23—*American Paper and Pulp Association*—9:00 a.m. Classification and Definition Committee, 4-L; 9:00 a.m. Waste Utilization Committee, 4-N-P; 2:00 p.m. Coordination of Research Committee, 4-J; 2:30 p.m. Biological Control Committee, 4-L; 2:30 p.m. Materials Committee, Carpenter Suite; 4:30 p.m. Committee on Stream Improvement, Secretary's Suite.

Association of Pulp Consumers—12:00 p.m. Directors' Luncheon, Pillement G-H.

Forest Industries Information Committee—9:30 a.m. National Committee, 4-M; 6:00 p.m. Dinner, Le Perroquet X.

Sulphite Paper Manufacturers Association—10:00 a.m. Budget, Crane 4-V; 11:00 a.m. Board of Governors, Crane 4-V; 12:30 p.m. Luncheon, Le Perroquet Y; 2:00 p.m. Annual Meeting, Le Perroquet Y.

The Tissue Association—10:00 a.m. Joint Toilet & Towel, Jansen Suite; 2:00 p.m. Facial Tissue, 4-M.

United States Pulp Producers Association—10:00 a.m. Executive Board

(Continued on page 20)

Tissue Groups Plan Paper Week Program

NEW YORK—Beginning with a joint meeting of its Toilet Paper and Paper Towel Product Groups at 10 a.m., Monday, February 23, 1948, in the Jansen Suite at the Waldorf-Astoria, the Tissue Association, Inc., has lined up one of the most interesting programs in its history. At the Monday morning meeting, L. J. Cook of the New York City Board of Education will discuss the large-scale experiments now being carried on in the city's schools looking toward the eventual general use of paper towels throughout the system's 875 school buildings. These experiments which cover some 12 buildings of various ages of construction and different types of students are expected to give the answer to the most practical way of providing all pupils with hand-washing facilities.

B. W. Scribner of the National Bureau of Standards will discuss recent developments in Federal specifications for toilet paper and paper towels and representatives of the Armed Services will be persent to discuss their 1948 requirements for toilet paper and paper towels. In addition there will be a discussion of the possibilities of promotional activities for these products.

Monday afternoon, the Facial Tissue Product Group will meet at 2 p.m. in room 4-M for its annual meeting. Chairman Robert M. Young of Pond's Extract Company will detail the plans for visits to various mills by Weights and Measures officials for the purpose of familiarizing them with the problems of the industry. There will also be a discussion of the best ways and means of evaluating the future demand for facial tissue through the pooling of information with the association and the serious effect on freight costs which would result from current Uniform Classification proposals will be fully discussed. Since this Product Group has expanded its capacity more rapidly than any other in the Tissue industry since the war, there will be particular interest in the secretary's forecasts of 1948 production of boxed facial tissue, two-ply and multi-ply roll toilet paper and other converted products made from this group's jumbo roll production.

On Tuesday the 24th, the day will be devoted to the problems of the producers of wrapping, waxing and industrial tissues. At 10 a.m. a joint meeting of the Wrapping Tissue and Jumbo Roll Product Groups will be held in room 4-M. The labeling program for wrapping tissue and the postponed market research program for wrapping and waxing tissues will be important subjects on the agenda together with a general discussion of statistical and other problems. The No. 2 Wrapping Tissue Product Group will meet at luncheon in the Carpenter Salon at 12:30 p.m. Outside of the election of officers for 1948, the principal subject at this meeting will be the place of No. 2 wrapping tissue in the market research program.

HON. LOWELL B. MASON

At 3 p.m., the Gift Wrapping Product Group will meet in room 4-M. The principal subjects of discussion will be: first, an evaluation of the lessons learned during the first full year of operation without government controls; second, the application of these lessons to the future growth and development of the industry. The secretary's report on his visits to Gift Wrapping producers in twenty-one states during the summer of 1947 will be an important contribution to these discussions.

On Wednesday, the General Tissue Industry meeting in the Jade Room will be the climax of the Tissue Association's 1948 Paper Week activities. In addition to the routine business to be transacted, including the election of four directors at large, a program of great interest to the entire industry will be presented.

Pierre Landry, European representative of the United States Pulp Producers Association, will discuss the overseas pulp situation. He will be followed by Dr. Charles W. Boyce who will review 1947 conditions in the pulp and paper industry in the United States and will discuss the outlook for 1948. Dr. Boyce's annual talks at these meetings have become one of their outstanding features. Another return engagement will be E. W. Tinker's discussion of overall association problems.

Edwin B. George, Economist for Dun & Bradstreet, at present serving as a consultant for the Select Committee on Foreign Aid of the House of Representatives (Herter Committee), will discuss today's business conditions.

Wednesday afternoon, the newly elected board of directors will end all formal Tissue Association activities for the week with its meeting for the election of officers for the ensuing year.

Waxed Paper Group To Meet February 25

NEW YORK—The Honorable Lowell B. Mason, Commissioner of the Federal Trade Commission, will give the main address when the Waxed Paper Institute holds its annual industry wide meeting at the Waldorf-Astoria in New York on February 25. His subject will be "U. S. Federal Trade Commission and Business — Friend or Foe?"

Other speakers on the program will include Winfield S. Bondy, consulting engineer, who will talk on "Technical Developments in the Handling of Wax," Loren J. Freund whose subject will be "The First Seven Months Under the Taft-Hartley Act," and George Lamb who will discuss "The Government Plan of Voluntary Allocations."

Results of the Waxed Paper Institute National Merchandising program will be reviewed and future promotional plans discussed. Annual reports will be made by W. P. Patterson, The Specialty Paper Company, chairman of the Statistical Committee, and by T. A. Sullivan, H. P. Smith Paper Company, chairman of the Industrial Relations Committee. New officers for 1948 will be elected.

Stream Improvement Group To Meet February 25

NEW YORK—The annual meeting of members of the National Council for Stream Improvement will be held at the Waldorf Astoria at 2 p.m. on February 25. The Council has obtained as speakers Arthur D. Weston, chief sanitary engineer of the Massachusetts Department of Public Health, and Dr. Rolf Eliassen, Professor of Sanitary Engineering of New York University.

The title of Mr. Weston's address will be "Viewpoint of a New England State Regulatory Agency on Water Pollution by Municipal and Industrial Wastes," and the title of Dr. Eliassen's address will be "Relationship of the Equities involved in Surface Water Usage." In addition to the addresses to be presented, there will be a detailed review of the Council's stream improvement activities during 1947 which is believed will be of interest to those in the regulatory field.

Maine Alumni to Gather February 23

NEW YORK—The annual University of Maine alumni luncheon will be held Tuesday, February 23, at the Hotel Commodore. This luncheon is held annually during "Paper" Week and is open to all University of Maine alumni and their guests. Announcement will be made at the convention in regard to time and room.

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Limitamp quickly and easily brings these mad short circuits under control. In less than *one-quarter* cycle, Limitamp's EJ-2 fuses cut off a rise in current from a short, and clear it in one-half cycle—long before the fault current has time to harm the contactor or motor. Your plant's power system needs this prompt handling of fault currents, and you will avoid the risk of costly shutdowns that can result from *one mad short circuit.*

A STARTER AND PROTECTOR IN ONE CABINET

G-E Limitamp control consists of an air-break contactor (the motor starter), and EJ-2 fuses (the short-circuit device). They are mounted in separate compartments of one, all-steel cabinet. Air-break contactors are specially designed for hard duty. Operating experience has proved that they furnish dependable, long-lived, low-cost service with only routine inspection.

Because they operate in air, they eliminate the problem of handling oil. And tip life of air-break contactors is many times that of comparable oil-immersed tips.

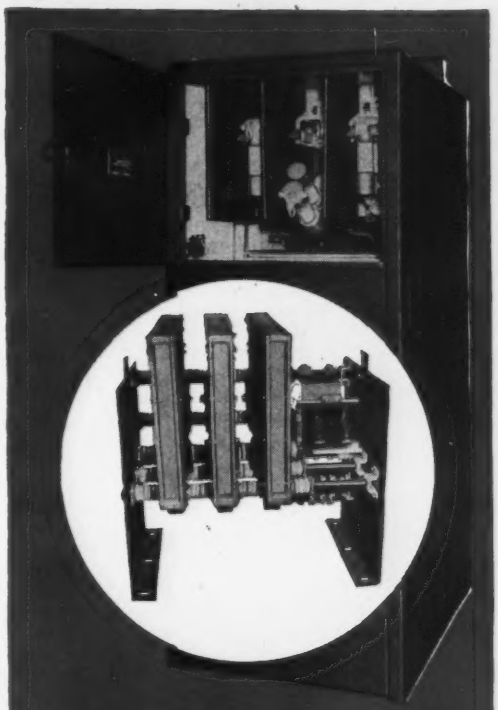
EJ-2 fuses are easy to replace, and they can't wear out. When you install a new fuse, you know your short-circuit protective device is in perfect condition.

OVERLOAD AND UNDERVOLTAGE PROTECTION

Isothermic overload relays, accurately calibrated against actual motor characteristics, guard the motor against overheating from sustained loads or single phasing.

FACTORY-ASSEMBLED CONTROL

Factory-assembled in one cabinet, Limitamp is easy to install, easy to co-ordinate with other control, saves space, and improves the appearance of your plant.



Limitamp control is furnished as a single unit, in groups, or in special enclosures for special operating conditions.

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FINANCE

West Virginia Profits Safeguard Future

NEW YORK—Despite spiraling costs and trying shortages, new records in production, sales and earnings were established for the fiscal year ended October 31, West Virginia Pulp and Paper Company reported this week in its annual report to stockholders. In achieving these results, the company faced the highest operating costs in its history, accounting for record expenditures for payrolls, materials, supplies, services and other charges.

As the result of a year of uninterrupted operation, the company's six integrated pulp and paper plants produced a total of 637,542 tons of paper and paperboard, eclipsing 1946's record volume of 589,339 tons. This volume involved the production of 607,521 tons of pulp, 10.7 percent more than in 1946. The production of chemicals also reached a new high in 1946.

Net sales of all products amounted to $85,989,056, as compared with $67,211,929 in 1946. After taxes and all charges, the company's earnings for the year were $10,935,424, as compared with $5,103,607 for the previous year. From these earnings the company paid $3,356,902 in dividends to approximately 4,000 stockholders and retained $6,262,026 for future needs.

David L. Luke, Jr., president, described 1947 as a "boom year, characterized by all the success—and the uncertainties—of an 'uneasy prosperity'."

"For a business like ours, with the security of thousands of employees and the investment of hundreds of stockholders dependent upon the continuity of success," he said, "one or two boom years represent only a brief opportunity to accumulate reserves against the contingencies of the future."

Today's distended economy, Mr. Luke said, makes it necessary for the company to maintain earnings at present levels because the cost of normal replacement now is far in excess of the funds allowed for depreciation and depletion.

He pointed out that the $3,461,528 set aside from 1947 income for depreciation and depletion is inadequate for even the most prudent replacements and that a large portion of these

(Continued on page 22)

Rhinelander Sales Up Thirty Per Cent

CHICAGO—Net sales of Rhinelander Paper Company went up 30 percent in 1947, bringing net income up 67 per cent according to reports issued in Chicago last week. Net totaled $1,310,216 compared with $782,611, equal to $6.72 a capital share as compared to $6.22 in 1946. Sales totals climbed to $9,744,204 from $7,483,052. Tonnage increased 7 percent and prices, according to the report, about 22 percent. Net earnings in the year amounted to 13.4 cents on the dollar of sales against 10.4 cents in the previous year. Total current assets on September 30 were $4,265,285 and current liabilities $710,954, a ratio of 6 to 1 compared with 5.23 to 1 a year before.

Northwestern to Buy Wisconsin Dam Bonds

MADISON, Wis.—The Northwestern Mutual Life Insurance Company has agreed to buy $8,500,000 of the bonds of Wisconsin River Power Company, the Wisconsin Public Service Commission was informed January 23. The bonds bear a rate of 2⅞ percent.

The commission held another hearing on the application of Wisconsin River Power to build a $7,599,800 hydroelectric power dam near Necedah, Wis., to be known as the Petenwell dam, and a $5,795,500 dam near Mauston, Wis.

Wisconsin River Power is capitalized at $13,500,000, with Northwestern Mutual holding $8,500,000 in bonds and three companies holding $5,000,000 in common stock. These companies are Consolidated Water Power and Paper Company, the Wisconsin Power and Light Company and the Wisconsin Public Service Corporation, each having one-third of the common.

Wisconsin River Power estimated it would collect $1,284,105 annually in revenues of which $300,000 would go for dividends and $244,375 for interest.

Marathon Declares Dividends

ROTHSCHILD, Wis.—Directors of the Marathon Corporation have declared quarterly dividends on both the common and preferred stock of the company. The common dividend of 25 cents, subject to a 2.5 percent deduction for Wisconsin privilege dividend tax, is payable February 20 to stockholders of record January 31, 1948. The preferred dividend will be $1.25 a share after deduction of Wisconsin privilege dividend tax, payable April 1 to stockholders of record March 20.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending January 24, 1948

STOCKS

	High	Low	Last
A. P. W.	4⅛	4⅛	4⅛
Armstrong Cork Co.	45⅛	43½	43¼
Armstrong Cork Co., pf.	91¾	89½	89½
Celotex Corp.	26⅛	23⅞	23⅞
Celotex Corp., pf.	19⅞	19⅞	19⅞
Certain-Teed Products Corp.	16¾	14⅜	15
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	20¼	19¼	19⅜
Champion Paper & Fibre Co., pf.	100	97	97
Congoleum Nairn Co.	31	29¾	30
Container Corp. of America	40¾	38⅜	40
Container Corp. of America, pf.	96½	95¼	95¼
Crown Zellerbach Co.	30½	29	29⅜
Crown Zellerbach Co., pf. 4.20	94½	93½	94
Crown Zellerbach Co., 4 pf. 4	113½	113½	113½
Dixie Cup Co.	35	32½	35
Dixie Cup Co., A	52	52	52
Flintkote Co.	34	32	32¼
Flintkote Co., pf.	101	99¾	100¼
Robert Gair	8	7½	7¾
Robert Gair, pf.	19¼	19⅛	19⅛
International Paper Co.	50⅜	47	47⅛
International Paper Co., pf.	96	95¼	95½
Johns-Manville Corp.	39½	36¾	37½
Johns-Manville Corp., pf.	105	101¾	102½
Kimberly-Clark Corp.	22	20½	21
Kimberly-Clark Corp., pf.	99½	98½	99
Mac Andrews & Forbes	38	37½	37½
Mac Andrews & Forbes, pf.	....	....	....
Marathon Corp.	23¼	22	22½
Mead Corp.	19⅜	18⅞	19¼
Mead Corp., pf. 4¼	94	92¾	92¾
Mead Corp., pf. 2	41	40	40
National Container Corp.	12¾	12	12⅜
Paraffine Companies, Inc.	76	75	75
Paraffine Companies, Inc., pf.	102	102	102
Rayonier, Inc.	27⅜	23	23½
Rayonier, Inc., pf.	33⅞	32½	32½
Ruberoid Co.	58⅛	54½	56
St. Regis Paper Co.	9⅝	9⅛	9¼
St. Regis Paper Co., pf.	81	80	80
Scott Paper Co.	43¼	41	41⅜
Scott Paper Co., pf.	94¾	94	94¾
Sutherland Paper Co.	41½	38⅛	38⅜
Union Bag & Paper Corp.	31¾	29½	30⅛
United Paperboard Co.	....	....	....
U. S. Gypsum Co.	97	93	94
U. S. Gypsum Co., pf.	175	175	175
United Wallpaper	5⅝	5	5⅛
United Wallpaper, pf.	34	34	34
West Virginia Pulp & Paper Co.	43	39¼	43
West Virginia Pulp & Paper Co., pf.	104	103¾	103¾

BONDS

Celotex Corp., 3¼s '60	....	....	....
Certain-Teed Products Corp., 5½s '53	....	....	....
Champion Paper & Fibre Co., 3s '65	....	....	....
Mead Corp., 3s '68	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending January 24, 1948

STOCKS

	High	Low	Last
Great Northern Paper Co.	42½	41¾	42
Taggart Corp.	10¾	10½	10½

HYCAR AMERICAN RUBBER LATEX... imparts valuable properties to pulp and paper

HYCAR latex added directly to the pulp in the beater or head box, or used as an impregnant for paper, imparts valuable properties not otherwise readily obtained.

Tear and wet strength are considerably increased. Resistance to oils, solvents and chemicals is obtained, with retention of good aging properties. The addition of Hycar also insures excellent flex life and scuff resistance, and in thick papers prevents separation of the laminations.

Thus, better physical properties may be obtained in high grade pulp. In other cases the use of lower grade stock may be permitted because of improved physical properties obtained by the use of Hycar latex. Paper is made adaptable to fields where it is not now used.

Present and potential applications for papers of this sort range from wallpaper to insoles, from gaskets to leather replacement material, from shelf liners to packaging papers.

HYCAR latex is very easy to use. In most applications no vulcanization is required. Normal drying times are used. And HYCAR latex is an inherently safe material to handle. *No solvent system is needed.*

We would be glad to work with you on any problems relating to the use of HYCAR latex. For more information, please write Department **HJ-2,** B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U. S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
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Kalamazoo to Stage Session on Coatings

KALAMAZOO — Headquarters for the March 18th meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents Association will be the Park-American Hotel. This will be the annual coating meeting and as far as the records show it will be the first all-day session devoted entirely to the mechanical phases of drying, calendering, and winding of coated paper.

Herman G. Rappolt, vice-president, J. O. Ross Engineering Corporation, will speak on drying. E. E. Thomas, Appleton Machine Company, will handle the calendering and the practical supering demonstrations. A. A. Neese, mechanical engineer, Beloit Iron Works, will read a paper on winding. John F. Halladay, consultant, of Elkhart, Indiana, will serve as moderator.

A panel of such outstanding coating men as Norman I. Bearse, Champion-International Company, Lawrence, Mass.; Kenneth W. Osborne, The Ohio Boxboard Company, Rittman, Ohio; Charlie Crow, The Mead Corporation, Chillicothe, Ohio; Richard Peeters, St. Regis Paper Company, Kalamazoo; and others will assist the moderator.

A tentative program line-up is as follows: 9:30 a.m. to 12 noon, mill visitations and demonstrations; 1 p.m. to 2:30 p.m., luncheon at Park-American; 2:30 p.m. to 4 p.m., first paper; 4 p.m. to 5:30 p.m., second paper; 6:30 p.m., dinner at Park-American. This will be followed by the third paper and evening program with discussion.

Industrial Club Visits IPCO Niagara Plant

NIAGARA FALLS, N. Y.—A first hand glimpse of industrial paper making processes was enjoyed by 131 members of the Niagara Falls Industrial Club when they were taken on a tour of the International Paper Company's local plant.

Welcoming the group were H. P. Bailey, general manager, and George H. Rand, Jr., assistant manager. The program was arranged by Roy Adamson, keyman of the Niagara Falls Industrial Club at the International Paper Company.

Junior Forest Warden Program is Expanded

VANCOUVER, B. C.—A new organization of over 14,000 Junior Forest Warden graduates is being formed to perpetuate objectives in forest conservation, and to help as leaders of Junior groups. This was stressed by W. F. Myring, chief warden, in his report for 1947.

Addition of more than 2000 more recruits in 1947 has brought enrollment to nearly 3600 membership, with 38 new warden districts organized the past year, establishing 85 throughout British Columbia.

Last year 1180 forestry badges were awarded along with 673 for signalling abilities, 968 First Aid, 987 woodlore, and 180 swimming and lifesaving.

Junior Forest Warden work is sponsored by the Canadian Forestry Association of which Ralph S. Plant is president and George X. Miller, secretary manager.

Commission Insists On Tree Protection

MADISON, Wis.—The Wisconsin Conservation Commission has told the Legislative Council that opponents of public regulation to prevent the cutting of immature trees in the state must be prepared to offer an alternative method of guaranteeing future raw materials to the pulp and paper industry and other wood-using concerns.

Director Ernest Swift of the commission indicated recently that the commission will make another attempt to obtain legislation covering the cutting of timber within the forest protection zones. Paper and pulp interests have supported the proposed legislation in the past.

"People generally admit that our government must and should protect the forests, the watersheds, the minerals and soil, but they want it accomplished without tampering with their pet freedoms," the commission's statement said.

"It should be pointed out also that those who do not want controls simply because they do not like controls of any kind should be able to advance some sound, workable program guaranteeing a renewable supply of timber to Wisconsin for Wisconsin industry and her people."

Bullock Reports on Customs Claims

NEW YORK — A San Francisco importer of duplex kraft, as reported by Warren B. Bullock, manager of the Import Committee of the American Paper Industry, has abandoned his claim of the sheathing paper rate of 10 percent on merchandise classified for duty at 20 percent as kraft paper.

Importers have abandoned fifty-seven cases involving the dutiability of bibulous and similar papers imported in sheets and rolls. The paper was classified for duty as tisue paper at 6 cents per pound and 20 percent, but had been claimed dutiable at 5 cents per pound and 15 percent as filtering paper.

Importers have also abandoned seventy-seven cases involving tissue paper coffee filters in disc form. The paper was assessed for duty at 6 cents per pound and 20 percent, 5 cents per pound as tissue paper, but had been claimed dutiable as filtering paper at 5 cents per pound and 15 percent.

Trees for Tomorrow Starts New Contest

MERRILL, Wis. — Entry blanks have been distributed for competition in the fourth annual $2500 Trees for Tomorrow forestry scholarship program. Senior boys in 33 north central Wisconsin high schools are eligible to compete for the five $500 awards.

The awards are based on previous interest shown in forestry, scholarship standing in class, an essay of 500 words telling why the applicant is interested in forestry as a career, and a personal interview before the district scholarship committee.

In announcing the 1948 awards, Folke Becker, of Rhinelander, president of Trees for Tomorrow, said, "The objectives of the forestry scholarship program are, first, to help those students who show an aptitude and earnest desire to make forestry their career, and, second, to spread the knowledge of conservation among young people who will be the trustees of our forests of the future."

Chairmen of the local award committees in each of the five scholarship districts are: Leonard Kuehl, vice-president, Flambeau Paper Company, Park Falls; N. S. Stone, vice-president, Mosinee Paper Mills, Mosinee; D. C. Everest, president, Marathon Corporation, Rothschild; A. J. Schierl, secretary-treasurer, Whiting Plover Paper Company, Stevens Point; E. B. Hurst, head of Woodlands Division, Consolidated Water Power and Paper Company, Wisconsin Rapids.

Hague Is Honored For Safety Service

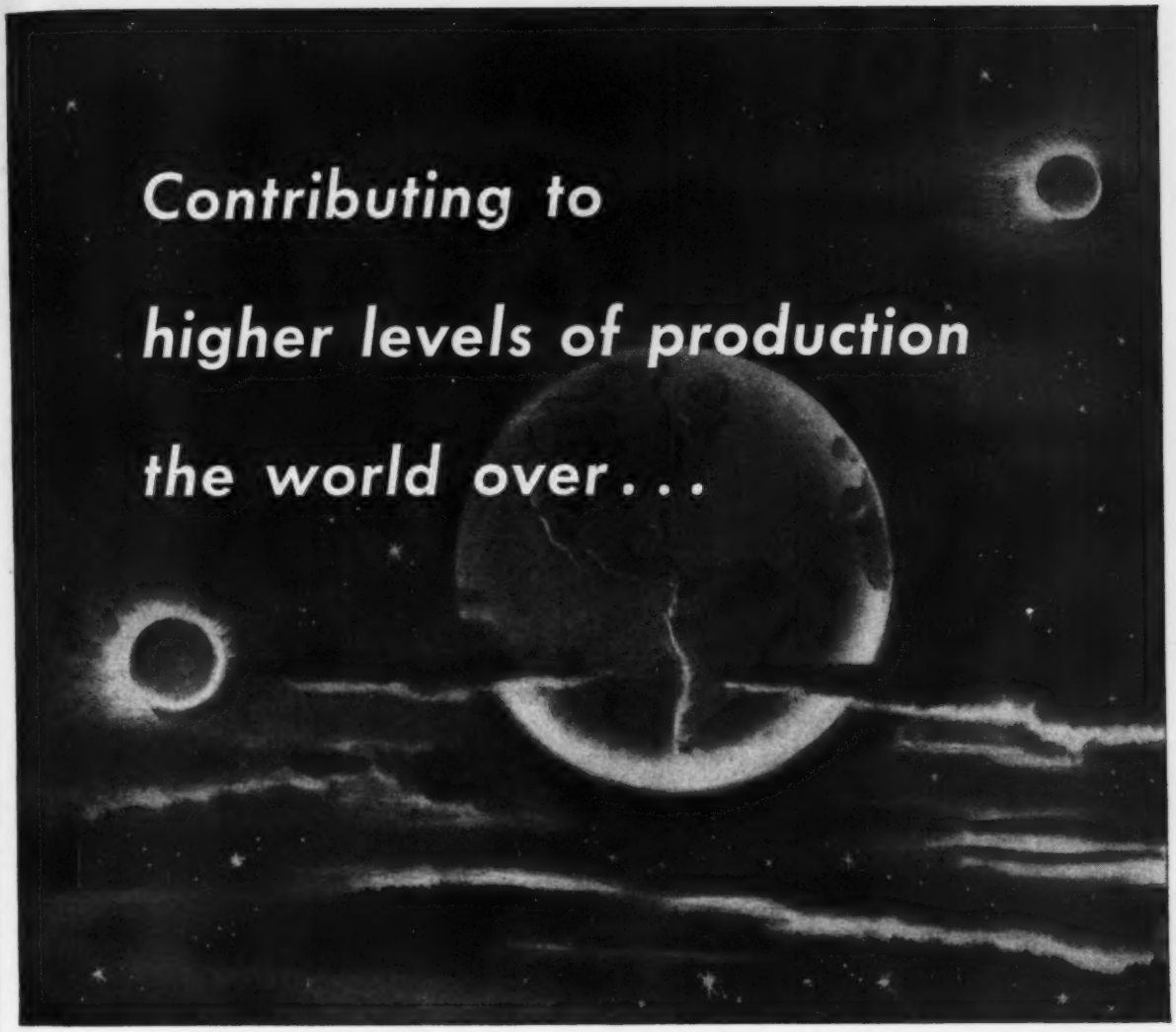
VANCOUVER, B. C.—Cyril J. Hague, assistant to the personnel director of Pacific Mills Ltd., Vancouver, B. C., was recently presented with a special Certificate of Service by the St. John Ambulance Association in recognition of his assistance to the organization in safety education and first aid training.

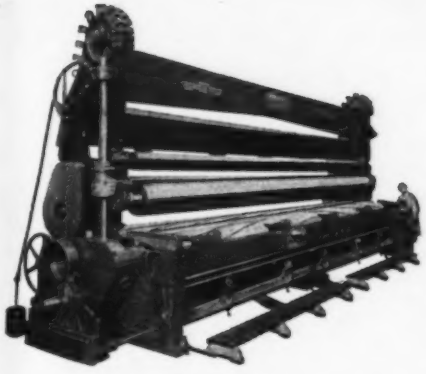
The presentation was made by Lt.-Col. Roy Mustard, M.D., chairman of the B. C. Division of St. John Ambulance Association, at a meeting held to commemorate 100 consecutive days of accident-free operations at Pacific Mills' Vancouver paper converting plant.

Mr. Hague joined Pacific Mills at its Ocean Falls' division in 1927 and became personnel manager at the up-coast pulp and paper plant in 1942. He was recently transferred to Vancouver head office as assistant to E. W. Campbell, the company's personnel director.

Neenah Credit Union Prospers

NEENAH, Wis.—Neenah Paper Company Credit Union has elected Dorothy Kolgren, Melvin Redline and Walter Foth as directors, and Walter Handler as committeeman. The union reported $91,917.18 in assets.





CAMACHINE 20, the largest of the mill type Camachines, is a popular pacemaker in high speed paper mill operation. Camachine 20 produces firm, uniformly wound rolls of newsprint, kraft or book paper at speeds up to 4000 fpm, handling webs from 180" to 310".

SWIFT CAMACHINES are singing a song of production in every continent of this world. Side by side with other great products of American engineering skill, Camachines are helping the peoples of all countries to rebuild toward a better life. At home, Camachines are meeting every industrial slitting and roll-winding problem to help boost production to the higher levels which must be achieved in the years ahead. For competent assistance with your roll production problems, consult

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FOR FAST, TOP QUALITY ROLL PRODUCTION

...the world over

C. Stewart Lee Retires; 40 Years With Pusey-Jones

WILMINGTON, Del.—The retirement of C. Stewart Lee, vice-president of the Pusey and Jones Corporation since 1924, was made known last week, following a meeting of the board of directors. Mr. Lee remains a member of the board. In forty years of association with Pusey and Jones in the manufacture and sale of papermaking machinery, Mr. Lee visited almost every important paper mill in United States and Canada, and traveled extensively in South America, England, western Europe and Russia.

Mr. Lee was general manager of Pusey and Jones during the first World War. He began in the sales department in 1907.

In a statement issued on his retirement, Mr. Lee paid tribute to his associates at Pusey and Jones and predicted that the next decade will see many wonderful new developments in papermaking machinery.

"For almost ten years the paper industry has been concerned with increased tonnages to meet the unprecedented demand for paper of every description," Mr. Lee said. "We are now at the beginning of an era of research and experimentation. Every day we are discovering how to make better paper. Every day we are learning how paper can be made to serve a multitude of new uses."

Research Institute Plans Nine-Lecture Series

MONTREAL, Que. — A series of nine illustrated lectures designed to outline the scope of the technical work of the pulp and paper industry of Canada has been scheduled by the Pulp and Paper Research Institute of Canada at McGill University, according to Dr. Otto Maass, general director of the Institute.

Specially intended for engineering students, the illustrated talks will be given in the lecture theatre of the chemistry building. The first lecture started January 20th, with Frank L. Mitchell, manager of the Canadian Pulp and Paper Association, as the first speaker.

St. Regis and Taggart Declare on Common

NEW YORK — Directors of St. Regis Paper Company at a board meeting last week declared a regular dividend of 15 cents a share on the common stock, payable March 1 to stockholders of record January 30, 1948.

Directors of Taggart Corporation, a St. Regis Paper Company subsidiary, declared a dividend of 15 cents a share on Taggart's common stock, payable March 1 to holders of record January 30, 1948.

J. O. Bulkley has resigned from the board of St. Regis Paper Company.

LLOYD R. COOPER

has been named director of research for Heppenstall Company, Pittsburgh. Mr. Cooper, who has been with Heppenstall since 1942, received the degree of B.S. in Chemical Engineering from Lehigh University in 1935. He then became a metallurgical observer at the Homestead (Pa.) Works of Carnegie-Illinois Steel Corp. He later worked in the U. S. Steel Corporation, Kearney, N. J., research laboratory. Mr. Cooper joined the Heppenstall-Eddystone Corp. in 1942 as engineer of tests. He organized and supervised the test department and laboratory at this Eddystone, Pa., forgings plant built and operated by Heppenstall for the U. S. Navy. When the plant closed in 1944, Mr. Cooper moved to Pittsburgh to serve as research metallurgist in the Heppenstall newly organized research department. He was appointed acting director of research in August, 1946.

Hooker Promotes Edwards to Sales Development Department

NIAGARA FALLS, N. Y.—John P. Edwards has been promoted to the sales development department of the Hooker Electrochemical Company. He will handle technical correspondence with respect to the use and application of Hooker Chemicals by all customers.

Mr. Edwards is a chemical engineer by training, having been graduated from the University of Minnesota in 1940. Coming directly to the Hooker Company in that year, he has been associated with the Process Study Group.

Institute Re-elects Fowler

MONTREAL, Que. — R. M. Fowler, president of the Canadian Pulp and Paper Association, Montreal, was re-elected president of the Canadian Institute of International Affairs this week. Mr. Fowler said in his address at the Institute's 20th annual meeting that new material on economic and political matters is being published by the Institute.

Gould Names Paul to Head Stationer Department

NEW YORK — Myron H. Paul, for ten years Eastern field representative for Whiting-Plover Paper Company of Stevens Point, Wis., will head a new Stationers' Division of Reinhold-Gould, Inc., metropolitan paper distributors. A graduate of the University of Michigan with a degree in heating and air conditioning, Paul chose paper marketing as a career. Paul helped to build a network of permanized papers distributors from Maine to Florida.

Harry E. Gould, president, called Paul's experience in paper merchandising "unique" and of "especial value to the retail stationery trade." Citing Paul's missionary activities in the marketing of Keebord Typewriter Papers by Whiting-Plover distributors, Mr. Gould underscored his new employee's "close acquaintance" with the inventory and sales problems of the stationers and his invaluable assistance to them. Paul last week established his headquarters at Reinhold-Gould's Fifth Avenue offices.

Marathon 25-Year Club Admits 17 New Members

MENASHA, Wis.—The Quarter Century club of Marathon Corporation admitted 17 new members at its fifth annual banquet at St. Patrick's hall Thursday evening, January 22. The banquet was attended by 163 members of the club, and D. C. Everest, Marathon president, welcomed the new members and presented each with a certificate of service and an engraved gold watch.

Hugh F. Geibel was toastmaster. The Rev. Joseph J. Ahearn of St. Patrick's church gave the invocation, and the Marathon Choral club of 45 voices, under the direction of Rei Ganzer, sang six numbers.

There are now 435 men and women on the rolls of the Marathon Quarter Century club in its plants in the United States.

Heyden Elects Three To Board of Directors

NEW YORK — Election of two new vice-presidents and three new board members of the Heyden Chemical Corporation was revealed this week by B. R. Armour, president.

Simon Askin and Dr. Ralph N. Luluk were named vice-presidents and were also elected to the board. Clarence Capes, vice-president of the Bank of the Manhattan Company, was the third director named.

Mr. Askin has been associated with Heyden since 1943 and has been an officer of the company since 1945. Dr. Luluk has been research manager of Heyden since 1946 and has also had charge of the ammonia division and of the antibiotic division of the corporation.

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DISTRIBUTORS OF WOOD PULP
BLEACHED AND UNBLEACHED
CHEMICAL AND MECHANICAL WOOD PULP

The only time Paul Bunyan lost his temper was during the year of the Two Winters. Everything froze solid, including his blankety-blank-blanks. Even Paul's hardened lumberjacks were shell-shocked when his cuss words thawed out in the spring.

A reproduction of this incident from the fabulous life of Paul Bunyan—the twenty-sixth of a series—will be sent on request. It will contain no advertising.

Weldment Contractors Set Up Trade Group

MILWAUKEE—A nucleus of eastern and middle western weldries recently organized the American Weldment Manufacturers Association to promote mutual understanding among welders and users of welded products and to solve the problems that face the welding industry today. Prompted by the need for recognized standards and trade policies for the industry, a group of executives from several large commercial weldries established the association to aid the industry in profitable expansion and progress on its merits as a new competitive major manufacturing process. Thirty years ago the foundry industry faced the same situation and out of it grew the Steel Founders' Society of America. Patterned after this group, the AWMA hopes to create a code of standard practices and to investigate marketing problems.

After three pre-organizational meetings, the group elected a board of directors, drew up a constitution and elected officers. Ken F. Ode, superintendent of the Welding Division of The Falk Corporation, Milwaukee, is the AWMA president. Other officers are William Simpson, manager of sales of Lukenweld, Inc., Coatesville, Pa., vice-president; A. S. Frederickson, vice-president of Lakeside Bridge and Steel Company, Milwaukee, treasurer; and Hugh Hodges, Graver Tank and Manufacturing Company, East Chicago, secretary.

Full membership is open to all contract weldries in the United States. Member companies may have an unlimited number of representatives in attendance at meetings, but each company, large or small, has only one vote in the Association. Welding companies, operating captive shops, are eligible for associate memberships. They may attend meetings and participate in discussions but they may not vote or hold office in the organization.

Lou Kenny of The United Welding Company, Middleton, Ohio, is chairman of the membership committee.

Kipnis Finds Container Industry In Promising Position

LONG ISLAND CITY, N. Y. — Samuel Kipnis, president of National Container Corporation, reported late in the week that the board of directors had declared a regular quarterly dividend of thirty cents per share upon each share of the issued and outstanding common stock of the company, payable March 10, to stockholders of record as of the close of business February 16.

Earnings for the company are estimated at approximately $4 per share for the year 1947. After the regular annual dividend on the common stock of $1.20 per share, ample surplus is retained by the company for sinking fund and other fixed obligations, thereby continuing the company in an excellent current financial position.

"National Container Corporation," declared Kipnis, "is one of the largest integrated companies in the industry and it manufactures substantially all of its finished products from all kraft materials. It is my considered opinion the kraft, pulp and paper industry as a whole, and the kraft shipping container industry in particular were never in better position than they find themselves in now. It will take years before production of kraft will catch up with the demand, particularly in the corrugated shipping container industry."

Alberta Pulp Mill Would Use Natural Gas

OTTAWA, Ont. — Plans for the construction of a $14 million pulp and paper mill in Alberta are being discussed by Montreal financiers and other interested parties.

R. O. Sweezy, Montreal financier, is quoted as saying that the proposal, as it now stands, calls for an integrated pulp, newsprint and wrapping paper mill.

It is understood that neither the provincial authorities nor the mill backers have yet specified the exact location of the mill.

However, it is reported from Montreal that a provincial spokesman has stated that promoters are interested in natural gas as a source of power. Mill backers say that no expenditure will be required for power development, at least in the initial stages.

Pulpwood supplies for the mill would come from the Alberta foothills, possibly from the area northwest of Edmonton, Lands Minister Hon. N. E. Tanner said.

Hooker Declares Dividends On Preferred and Common

NIAGARA FALLS, N. Y.—The board of directors of the Hooker Electrochemical Company declared a quarterly dividend of $1.0625 a share upon its $4.25 cumulative preferred capital stock, payable March 26, to stockholders of record as of the close of business March 2, 1948. The directors also declared a dividend of 30 cents a share upon its common capital stock ($5 par value), payable February 26, 1948, to stockholders of record as of the close of business February 3, 1948.

MacCorquodale Addresses Wisconsin Chemists

APPLETON, Wis. — Dr. D. W. MacCorquodale, head of biochemical research at Abbott Laboratories, addressed the Northeast Wisconsin section of the American Chemical Society January 20, after a dinner at 6:30 in the evening. His topic was "Some Applications of Chromatography."

Waste Dealers Ready Convention Plans

NEW YORK — A statement just released from the executive offices of the National Association of Waste Material Dealers, Inc., reports nationwide enthusiasm among the members of that Association for the coming thirty-fifth annual convention to be held at the Hotel Statler, Boston, from March 22nd to 24th, inclusive, with a pre-convention period of two days, March 20th and 21st.

Not since the twenty-fifth anniversary of the Association have plans anywhere near approached those for the convention to be held in Boston, the city where the Association was organized thirty-five years ago. Hotel reservations already made indicate not only a very large local attendance but a very substantial attendance from every section of the United States and Canada. In addition to the entertainment features directly under the control of the convention and entertainment committee, from fifteen to twenty large concerns in the membership will have entertainment rooms in operation throughout the period of the convention.

The thirty-fifth anniversary banquet is to be held on the evening of March 24th, exactly thirty-five years from the day the Association was organized at Youngs Hotel, Boston. Sidney Danziger of New York is chairman of the convention and entertainment committee and he has associated with him a large committee representing eastern members, who will act as hosts to delegates and their ladies attending the president's party.

Smith & Winchester Ships To South Africa

SOUTH WINDHAM, Conn. — The Smith & Winchester Manufacturing Company has shipped a five-wall, flat bag tubing machine and two bottoming machines to Natal, South Africa, for use in making multi-wall, pasted-bottom, bags for cement, fertilizer and other chemicals. The machines are of the very latest design, the tuber having special cross pasting units and compensating drive for smooth, fast operation under all conditions. Representatives of the South African firm recently visited the Smith & Winchester plant to inspect these machines under operating conditions before shipment.

Three multi-wall tubers for pasted-bottom bags and one six-wall machine for sewed valve type bags have been shipped by Smith & Winchester within the last six months.

Hammermill Dealers Dividend

ERIE, Pa. — The board of directors of the Hammermill Paper Company has declared a dividend of 37½ cents on the common stock. The company previously paid 25 cents quarterly.

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TOP ROLL COVERS

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Duratex, the hard top press roll cover made from a patented composition, has little affinity for paper, releases stock cleanly without pick-up . . . produces a smoother sheet with less fuzz.

The day Duratex was produced at Cincinnati, the operation of top press rolls received a big up-lift in efficiency and operation effectiveness. Duratex is a decided improvement on all types of top roll covers.

With Duratex on the job, you eliminate many operation difficulties in the presses . . . you gain these distinct advantages:

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Duratex is proved. Its performance is unquestioned. It is the most effective top roll cover produced today. Paper mills who are using Duratex back us up on this claim.

THE CINCINNATI RUBBER MANUFACTURING CO.
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CINCINNATI *RUBBER*

Paper Week Program Shows Full Schedule

(Continued from page 9)

Meeting, Carpenter Salon; 12:30 p.m. Luncheon, Le Perroquet X; 2:30 p.m. Annual Meeting, Jansen Suite.

Writing Paper Manufacturers Association—10:00 a.m. Executive Committee, 4-F; 1:00 p.m. Bristol Board Group Luncheon, Followed by Meeting, 4-F.

TUESDAY, FEBRUARY 24 — *American Forest Products Industries*—7:00 p.m. Dinner, Pillement Suite.

American Paper and Pulp Association—9:00 a.m. Instrumentation and Research Committee, Crane 4-V; 9:30 a.m. Pulpwood Committee, 4-J-K; 10:00 a.m. Statistical Committe, 4-G-H; 10:00 a.m. Committee on Public Affairs, 4-F; 2:00 p.m. Technical Committee, Crane 4-V; 2:30 p.m. Export Committee, 4-U; 3:30 p.m. Forestry Committee, Carpenter Salon.

Blotting Paper Manufacturers Association—12:30 p.m. Luncheon, 4-F; 2:00 p.m. Annual Meeting, 4-F.

Coated and Processed Paper Association—10:00 a.m.—General Meeting, Club Suite, Commodore Hotel; 12:30 p.m. Luncheon, Club Suite, Commodore Hotel.

Groundwood Paper Manufacturers Association—10:00 a.m. Annual Meeting, Le Perroquet X; 12:30 p.m. Luncheon, Le Perroquet W; 2:00 p.m. Annual Meeting, Le Perroquet X.

Import Committee of Pulpwood Industries—1:30 p.m. General Meeting, Carpenter White.

National Council for Stream Improvement—10:00 a.m. Technical Committee, Basildon Room; 1:00 p.m. Luncheon, Basildon Room.

Newsprint Manufacturers Association—9:00 a.m. General Meeting, 4-L.

Paper Napkin Association — 3:00 p.m. Annual Meeting, Barclay Hotel; 6:00 p.m. Dinner, Barclay Hotel.

Salesmen's Association of the Paper Industry—3:00 p.m. Executive Committee Meeting, 4-K; 4:30 p.m. Annual Meeting, West Foyer.

Specialty Paper and Board Affiliates — 2:30 p.m. Photomount Group Meeting, 4-N.

Sulphite Paper Manufacturers Association—9:00 a.m. Unbleached Group, 4-N-P; 11:00 a.m. Manila Group, 4-N-P; 2:00 p.m. Machine Glazed and Wrapping Group, 4-P; 3:00 p.m. Bleached Group & Bleached Converting, 4-P.

The Tissue Association—10:00 a.m. Wrapping and Jumbo Roll, 4-M; 12:30 p.m. No. 2 Wrapping Group and Luncheon, Carpenter Salon; 3:00 p.m. Gift Wrapping, 4-M; 5:00 p.m. Overall Nominating Committee, 4-J.

Waxed Paper Institute—9:30 a.m. Executive Committee Meeting, Le Perroquet Y; 1:00 p.m. Luncheon, Le Perroquet Y; 2:30 p.m. Executive Committee Meeting, Le Perroquet Y.

Writing Paper Manufacturers Association—9:30 a.m. 87th Annual Meeting, Jade Room.

WEDNESDAY, FEBRUARY 25—*American Pulpwood Association*—9:30 a.m. Annual Meeting, Le Perroquet X; 2:00 p.m. Annual Meeting, Le Perroquet X; 6:30 p.m. Reception and Annual Dinner, Astor Gallery.

American Paper and Pulp Association — 2:30 p.m. Finance Committee, 4-N-P.

Glassine & Greaseproof Manufacturers Association—9:30 a.m. Executive Committee, 4-G-H; 11:00 a.m. Annual Meeting, 4-G-H; 1:00 p.m. Luncheon, 4-G-H; 2:00 p.m. Annual Meeting, 4-G-H.

Kraft Paper Association — 10:00 Executive Committee Meeting, 4-F.

National Council for Stream Improvement—10:00 a.m. Board of Governors, Annual Meeting, Carpenter White; 2:00 p.m. Annual Meeting of Members, Jansen Suite; 5:00 p.m. Meeting of New Board of Governors, 4-K-L.

Salesmen's Association of the Paper Industry — 12:30 p.m. Annual Luncheon, Ball Room.

Soda Pulp Manufacturers Association—4:30 p.m. Annual Meeting, 4-F.

Specialty Paper & Board Affiliates—10:30 a.m. Executive Committee Meeting, 4-N; 3:30 p.m. Coated Cardboard Group, 4-J.

The Tissue Association—10:00 a.m. General Industry Meeting, Jade Room; 3:00 p.m. New Board Meeting, Crane 4-V.

Waxed Paper Institute—9:30 a.m. General Industry Group, Wedgewood Room; 12:30 p.m. Luncheon, Wedgewood Room; 2:30 p.m. General Industry Group, Wedgewood Room.

Writing Paper Manufacturers Association—10:00 a.m. Cover and Text Paper Group, Carpenter Salon.

THURSDAY, FEBRUARY 26—*American Paper and Pulp Association* — 10:00 a.m. Executive Committee and Board of Governors, Meeting and Luncheon, Jansen; 3:00 p.m. Pulp and Paper Industry Council to Department of Commerce, 4-U; 6:30 p.m. Reception to Guests of Honor, West Foyer; 7:15 p.m. Annual Dinner, Ball Room.

American Pulpwood Association — 10:00 a.m. Members Meeting, Palm Room; 2:00 p.m. New Board of Directors, Crane 4-V.

Association of Pulp Consumers — 3:00 p.m. Annual Meeting, Jade Room.

Glassine & Greaseproof Manufacturers Association—3:00 p.m. Technical Committee, 4-G-H.

Kraft Paper Association — 12:30 p.m. Luncheon, Basildon Room; 2:30 p.m. Annual Meeting, Basildon Room.

Paper Napkin Association — 12:30 p.m. Luncheon, Barclay Hotel; 1:30 p.m. Annual Meeting, Barclay Hotel.

Vegetable Parchment Manufacturers Association—10:00 a.m. Annual Meeting, 4-J; 12:30 p.m. Luncheon, 4-J.

Waterproof Paper Manufacturers Association—10:00 a.m. Annual Meeting, Biltmore Hotel.

Writing Paper Manufacturers Association — 11:00 a.m. Thin Paper Group Meeting followed by Luncheon at 1:00 p.m., Carpenter Salon.

FRIDAY, *February 27—Forest Industries Council* — 10:00 a.m. Council Meeting, Jansen Suite.

Glassine & Greaseproof Manufacturers Association—9:30 a.m. Technical Committee, 4-G-H.

Final details of the Tappi program are still receiving their finishing touches. In general outline this section of Paper Week is scheduled as follows.

MONDAY, FEBRUARY 23—
General Session.
Microbiological Control Session.

TUESDAY, FEBRUARY 24—
Pulping Session.
Vocational Education Session.
Graphic Arts Session.
Fibrous Agricultural Residues Session.
Chemical Engineering Session.
Preparation of Paper Making Materials Session.
Paper Making (Fourdrinier) Session.

WEDNESDAY, FEBRUARY 25—
Structural Fibrous Materials Session.
Coating Session.
Wet-Strength Session.
Water Session.
Paper Making (Cylinder) Session.
Statistics Session.

THURSDAY, FEBRUARY 26—
Plastics Session.
Mill Instrument Control Session.
Containers Session.
Annual Luncheon.

Bemis Names Stetson to General Production

ST. LOUIS — Bradford R. Stetson, superintendent of the Minneapolis bag factory, Bemis Bro. Bag Company, since 1937, has been advanced to the company's General Production Department in St. Louis. Mr. Stetson is a graduate of Oberlin College and Massachusetts Institute of Technology. He joined the Bemis organization in 1927 as a member of the Engineering Department, St. Louis, and in 1930 transferred to Minneapolis. He was an engineer in what has since developed into Bemis Packaging Service, Minneapolis, until his appointment as superintendent of the bag factory there.

Nelson Talks Before Safety Council

MENASHA, Wis.—Harry A. Nelson, director of the Workman's Compensation Division of the Industrial Commission of Wisconsin, addressed the Twin City Safety Council on the operation of that division at a meeting at Germania hall January 21. Ninety-six representatives of Neenah and Menasha industries were present at the dinner meeting.

ST. MARY'S KRAFT CORPORATION

Selects

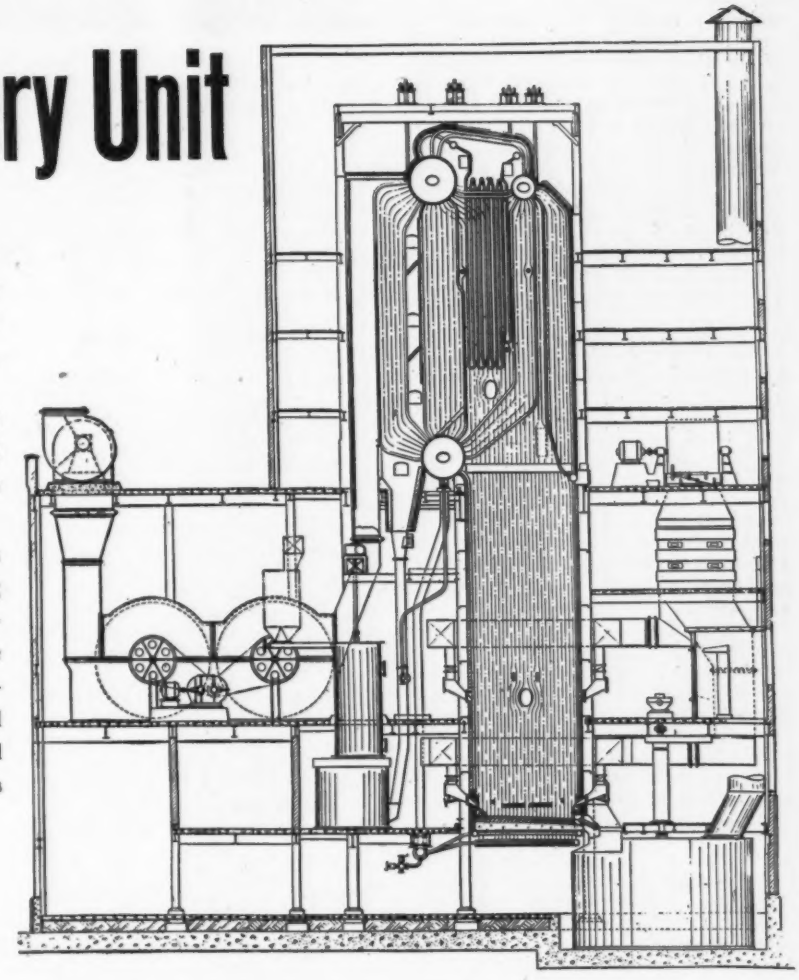
the

C-E Recovery Unit

A C-E RECOVERY UNIT, cross-sectional elevation of which is shown at the right, was recently purchased by the St. Mary's Kraft Corporation, St. Mary's, Georgia.

The unit is designed to burn 825,000 pounds of black liquor solids per 24 hours and will produce steam at 610 psi and 725 F.

The C-E Recovery Unit's reputation for efficiency, reliability and operating economy is built on a sound basic design enhanced over the years by the addition of carefully developed improvements. The St. Mary's unit will incorporate these many service-proved advantages. B-203



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C-E PRODUCTS FOR THE PAPER INDUSTRY INCLUDE STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; ALSO MANY TYPES OF PRESSURE VESSELS.

Garrett-Buchanan Sets Up Pensions

PHILADELPHIA — One hundred and seventy-eight employees and officials of the Garrett-Buchanan Company were entertained at the company's annual dinner on Friday, January 16, at the Barclay Hotel. Morgan H. Thomas, president of the company, highlighted the occasion when he announced that a new pension plan for employees had just been adopted by the management. The news was received with enthusiastic approval by all who attended the dinner.

Three employees were welcomed into the Garrett-Buchanan 25-year club, making a total of 41 members in the company's quarter century group. Each of the three new members received a gold and onyx signet ring in appreciation of their many years of faithful service. Nearly one-fourth of all employees of the company have served for twenty-five years or longer, making a total of 1284 years, represented by the members of the 25-year club. Estabilshed in 1873, the Garrett-Buchanan Company this year is celebrating its 75th anniversary in the wholesale paper field.

Members of the 25-Year Club at Garrett-Buchanan Company, Philadelphia. Three new members were welcomed into the Club on January 16, when they received handsome gold and onyx rings.

West Virginia Profits Safeguard Future

(Continued from page 12)

costs must be paid from $6,262,026 in retained earnings, which ordinarily would be used for expansion and improvements. The balance of the retained earnings will be needed for plant modernization and improvement projects and for possible charges under a pension plan for hourly employees now under consideration.

The report disclosed that the company's 8,600 employees received a record total of $23,481,775 in salaries and wages during the year. The payroll showed an increase of 21 percent over the $19,359,592 earned by the same number of employees in 1946. The average hourly rate was increased 15 cents, bringing the total increase since the end of the war to an average of 37 cents an hour. Similar adjustments were made for salaried employees.

All costs of operation showed sharp rises. The greatest increase was in the cost of materials, supplies and outside services, which rose from $18,860,668 in 1946 to $25,008,821. Pulpwood costs moved from $15,236,944 in 1946 to $16,090,066. Taxes continued to be a major item, rising from $6,136,036 in 1946 to $8,327,938.

Mr. Luke reported that the company continued its post-war program for plant rehabilitation and modernization during the year, despite the fact that costs were about 30 percent above the original estimates. He announced that the company had spent for plant improvements in 1946 and 1947 a total of $17,500,000.

He said that because of the high costs, the company plans little new construction during the coming year, particularly that would require new financing.

"New projects are nevertheless being planned and blueprinted," he said, "against the day when the relation between earnings and costs become clearer."

"In the long run," he added, "unless we keep our equipment efficient and improve and expand it sufficiently to hold a strong competitive position in our markets, our employees and stockholders will suffer severely."

Mr. Luke said he believed the current expansion of pulp and paper facilities is rapidly narrowing the gap between supply and demand and that a period of aggressive competition is not far off.

The only way to meet this competition, he said, is by operating more efficiently than ever, by making better products than ever, and by giving customers better service than ever. He expressed confidence that the company would meet this challenge.

Foremen Hear Talk On Economic System

KIMBERLY, Wis. — The Kimberly Foremen's club and its guests on January 19 heard Grey Miller of the executive staff of General Motors discuss the American economic system. Among those present were members of Kimberly-Clark management at Neenah and representatives of the corporation's Badger-Globe mill at Neenah and its mills at Kapuskasing, Canada, and Niagara, Wis., and of Thilmany Pulp and Paper Company at Kaukauna, and the Kimberly Chamber of Commerce.

Mr. Miller said that no other country distributes the products of its economic system so widely and so well. He said that the American dollar is the most stable economic unit in the world because wide distribution of production permits people to buy the things they want.

Senator Wiley Protests Ontario Pulpwood Policy

(Continued from page 7)

cut on private lands, but the great bulk of Canadian pulpwood is cut on crown land, with stumpage paid to the government, which claims the right to alter or cancel the arrangement at any time.

Among the many Wisconsin mills which will be directly affected are Northern and Hoberg at Green Bay, Thilmany Pulp and Paper Company at Kaukauna, Kimberly-Clark Corporation at Kimberly, Interlake division of the Consolidated Water Power and Paper Company at Appleton, Rhinelander Paper Company at Rhinelander, Marathon Corporation and Consolidated mills on the Wisconsin river, all of which use Canadian pulpwood.

It was pointed out that every mill using pulpwood is really involved, since closing of Canadian exports would result in a fierce battle for domestic supplies, far inadequate for the demand. Pulpwood handling for transshipment also would suffer.

The Wausau Paper Mills Company at Brokaw has been obtaining about 35 percent of its spruce from Canada. At this plant the spruce content of papers ranges from 65 to 100 percent.

Marathon Corporation receives about 35 percent of its spruce from domestic sources and the remaining 65 percent from Ontario. As the action of the province is largely motivated by its desire to encourage more pulp manufacture within the province, Marathon has more favorable agreements during the ten-year period, due to its erection of a large sulphate paper mill at Marathon, Ontario.

The Mosinee Paper Mills Company manufactures paper by the sulphate process, and it is said the company will not be affected by the curtailment in Ontario.

Wiley Protest Draws No Answer from Drew

TORONTO—The Ontario Government has received no representations from any state governor, nor any department of the Government of the United States, protesting provincial restrictions on the export of unprocessed pulpwood, Premier George Drew indicated this week.

The Premier was commenting on a press report quoting Senator Alexander Wiley of Wisconsin as saying that plans to cut down exports of pulpwood from Ontario "would have very adverse effects" on the pulp and paper industry in the United States.

Senator Wiley said he had written to Premier Drew, asking his comment, after receiving from the Canadian Embassy at Washington the outline of a plan under which some exports of spruce, balsam, fir and jack pine would end completely in 10 years.

"A letter from Senator Wiley was delivered to my office this week after I had already read an Associated Press dispatch," said Premier Drew.

"Under these circumstances it calls for no acknowledgement. His remarks obviously refer to restrictions on export of unprocessed pulpwood which were announced last October 2nd, and which have been in effect since that time," continued the Premier.

"We have received no representations from any state government, or any department of the government of the United States. It will be time to comment upon the points raised if and when we do," concluded Premier Drew.

Some surprise was expressed by officials of the Ontario Government on Senator Wiley's comments, since all exports of pulpwood from Crown lands, for many years, contain the provision that under no circumstances can the pulpwood be used for the manufacture of newsprint.

It is pointed out that Senator Wiley's letter suggests that these restrictions have not been observed.

Canada Pulp Products To Build in Vancouver

VANCOUVER, B. C. — Canada Pulp Products Company, which is financed by British Columbia capital, has been established in Vancouver and is proposing a revolutionary development to produce sponge from cellulose. The company originally planned to build on Vancouver Island, but because of high freight rates has decided to seek a location in Vancouver, a director said.

Meanwhile, the official explained, European producers of the product have requested permission of the local company to export a million sponges to America while the Canadian factory is getting into operation.

Formula for the product was evolved by a Danish scientist.

PULP and PAPER NOTES FROM AUSTRALIA

PERTH, W. A.—During the month of October, 1947, there was a heavy increase in the importation into Australia of newsprint, the dollar cuts not having come into operation. Total in rolls was 18,222 tons (12,471 tons for September) and in sheets, 644 tons (743 tons in September).

Importations of other printing papers in September were: (all in Australian hundredweights of 112 lbs.) Imitation art, 10,216; duplex, 14; other coated printing papers, 10,351; glazed imitation parchment, 693; other lithographic, machine glazed or one side calendered, 2,299; offset embossed, 21; poster printings or machine glazed, 933; other printing papers, 34,690.

October importations were: Imitation art, 7,761 (U.K. 3,160, Sweden 2,529, U.S.A. 1,529, Canada 366, Norway 177); other coated printings, 11,107 (U.S.A. 5,144, U.K. 4,242, Canada, 1,488, Italy 180, Norway 53); glazed imitation parchment, 707 (U.K. 425, Sweden 282); lithographic, machine glazed or one side calendered, 2,065 (U.K. 736, U.S.A. 647, Canada 392, Sweden 290); offset embossed, 680 (Sweden 209, U.S.A. 204, U.K. 175, Norway 75, Canada 17); other poster and machine glazed, 713 (U.K. 349, Norway 265, France 99); and other printing papers, 31,882 (U.S.A. 10,737, U.K. 5,821, Canada 5,224, Norway 4,020, Finland 2,496, France 2,014, Sweden 880, Netherlands 402, Czechoslovakia 288).

Pending clarification of details regarding dollar importation cuts it is suggested that a probable basis for 1948 will be: Imported newsprint, 35,000 tons; Tasmanian newsprint, 30,000 tons; and from stocks already held, 25,000 tons. This is assuming that the total allowance for the year will be 90,000 tons. Small users will probably take 15,000 tons of this (a cut of 22 per cent), leaving 75,000 tons for the metropolitan dailies and other large users (a cut of 57 per cent).

The annual report of New Zealand Forest Products Ltd. shows a net profit on manufacturing operations of $499,008, an increase of $65,326 on the previous 12 months. The directors state that "Due to the protracted extension of delivery dates for paper mill machinery, we have decided to concentrate our immediate efforts on the production of pulp. The major items of pulp plant can be manufactured in Australia and New Zealand from Swedish designs, and the company's chief engineer, Mr. H. W. Kilgour, is now in Sweden attending to this matter and, it is hoped, all establishment details should be completed at an early date. It will be recognized that the mill which it is proposed to erect (10,000 tons—to be enlarged later to 20,000 tons) is both a new and a major undertaking for New Zealand, and as it is the first mill to be established and will become the basis for future expansion, it is considered a matter of great importance to ensure that the final selection of plant and equipment will be most suitable for both present and future requirements."

Hope that Australia and New Zealand may become jointly self-sufficient in the production of newsprint lies behind a special survey of production resources to be made by both Governments. This is one aspect of proposals for intensive economic and industrial collaboration between the two countries to be examined following the visit of the Prime Minister (Mr. Chifley) to New Zealand.

The first of the new paper-making machines for the new Ballarat factory of Thomas Owen & Co. is to be shipped from Britain this month. With this plant will come a number of highly-skilled technicians.

The Cumberland Paper Board Mills Ltd. reports a net profit of $173,827 for the year ended September 30, 1947, an increase of $106 on the previous year. Profit, derived largely from dividends on shares in Australian Paper Manufacturers Ltd., has varied little in recent years, and an ordinary dividend (unchanged) of 6 per cent will be paid.

The Whakatane Paper Mills Ltd., New Zealand, reports a net profit of $71,361 for the year ended June 30, 1947. This compares with the $59,227 of the previous year. Approval of reconstruction schemes will now divide the company into two separate entities —Whakatane Board Mills Ltd., and Metea Forests Ltd. The former will take over the paper mills and the manufacturing interests of the company, while the latter will operate the forestry interests.

The recent removal of Primage by the Federal Government means a reduction in cost of one pound ($4.80 at par) on imported newsprint in Australia, and a reduction of approximately Ic. per lb. on imports of writing and printing paper from foreign countries. Primage on British paper has been low for a number of years, and its removal therefore does not have a very marked effect. Actually, any saving made is being offset by steadily increasing mill prices.

At a recent show in Adelaide, oranges packed in moisture-proof Pliofilm easily beat other exhibits packed in the conventional-style greaseproof paper, and growers are becoming increasingly interested in these new types of packing.

OBITUARY

Allan Lindsay Luke

ROANOKE, Va.—Allan Lindsay Luke, 66, retired official of the West Virginia Pulp and Paper Company, died January 24 of coronary thrombosis.

He was the son of John G. Luke, founder of the company, and was well known to Virginia business circles. He had been retired since 1929. His wife died in April, 1946.

After retirement he lived in Richmond and Kesiwick and came to Ft. Lewis in 1936 and purchased the old Payne estate. He was a native of Rockland, Del.

Luke was active in many local organizations, being a member of the Shrine, the Masons, the Shenandoah club and Roanoke country club.

Survivors include two sons and four daughters: Allan L. Luke, Jr., of Summersville, S. C.; John G. Luke, II, of Luke, Md.; Mrs. Merle L. Thompson, Washington, D. C.; Mrs. Kermit Birchfield, Ft. Lewis; Mrs. John J. Sheahan, Salem; and Mrs. William Breckenridge, Fincastle.

Other survivors are a brother, William Guthrie Luke, Pelham, N. Y., and a sister, Mrs. George E. Nelson, New York.

James W. Raines

ST. PETERSBURG — James W. Raines died at his Florida home on Friday, January 23rd, at 3:30 p.m. His death came suddenly. He had fully recovered from an attack of pneumonia which he had contracted in Maine during the latter part of November. He is survived by his wife, Mrs. Malissa Raines, 135 Lakeview Avenue, South, St. Petersburg, Florida, also his son, Dr. Herbert Raines, a daughter-in-law and granddaughter who reside at 6897 North 19th Street, Philadelphia. Interment was to be in the family plot in Philadelphia after the funeral at 2 o'clock January 29th from the Kirk & Nice Funeral Home in Philadelphia.

Mr. Raines has represented the Lindsay Wire Weaving Company, Cleveland, as salesman in the eastern states for 21½ years. Prior to joining the organization he was superintendent for four years at the Provincial Paper Company, Thorold, Ontario, and prior to that time he was boss machine tender at the West Virginia Pulp & Paper Company, Luke, Maryland. He was born at Moorefield, West Virginia, on July 26th, 1888.

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Paper Mill Operator interested in conversion to dry roofing felt production

One of our clients desires to obtain facilities for the production of dry roofing felt. Demand for his product is so great that he must assure himself a constant supply of roofing felt in considerable volume.

This is an opportunity for a mill owner to form a sound alliance that will have mutual benefits. Our client will not only sign a long-term contract, but will also provide financial assistance for the conversion to dry felt production.

The purchase of a small mill will also be considered.

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Carroll E. Maine

POTSDAM, N. Y.—Carroll E. Maine, 72, a retired stationery engineer of the Racquette River Paper Company, died January 19 in Potsdam hospital where he had been a patient for a week. Death was attributed to a heart ailment with complications.

Mr. Maine was born at Hermon, November 3, 1875. He attended the old St. Lawrence Academy in Potsdam and in 1902, married Miss Lucy Stacy of Brushton. The couple spent their married life in this village, and for the past 36 years had lived at their home, 15 Chestnut Street. Mr. Maine retired January, 1947, after having been employed as stationary engineer at the Racquette River Paper Company for 28 years.

He was a member of Racquette River Lodge, F.&A.M., St. Lawrence Chapter, R.A.M., the Maccabees and the First Baptist Church.

Andrew Wiesbauer

BUFFALO, N. Y. — Andrew Wiesbauer, who designed and manufactured jewelry boxes in Buffalo, N. Y., for 59 years, died January 13 after eight months' illness. Mr. Wiesbauer was 81.

Born and educated in Erie, Pa., Mr. Wiesbauer learned watchmaking when still in his teens and worked for a time as a jewelry store clerk. He became interested in jewelry manufacture when he came to Buffalo at the age of 20 to work for his brother, the late Joseph Wiesbauer, who operated the Wiesbauer Manufacturing Company, makers of jewelry cases.

After working for a short time for the Electric City Box Company, he established the National Jewelry Case Co., Inc., Exchange and Ellicott Sts., in 1905 in partnership with the late John Gocus and Louis Warner. The company, of which Mr. Wiesbauer was vice president, was dissolved in 1934. Two years later he formed a partnership with John P. Maue in the National Jewelry Display Company, 12 Waverly St., but sold his interest in 1945 when he retired because of illness.

William E. Sullivan

PHILADELPHIA — William E. Sullivan, manager of the Philadelphia sales office of Mohawk Paper Mills, Inc., died January 24, 1948, as a result of a heart attack. He had been in charge of that office since July 1936. Mr. Sullivan was born in South Hadley Falls, Mass., in 1895. He was employed by the American Writing Paper Company of Holyoke, Mass., for nearly 18 years. He entered the employ of Mohawk Paper Mills, Inc., in November 1935. He is survived by a widow and two daughters.

William Moriarity

POTSDAM, N. Y.—William Moriarity, 78, former superintendent of the Raymondville Paper Mill, Norfolk, N. Y., died recently in Potsdam hospital. He had been in failing health for the past year.

EQUIPMENT AND SUPPLY NEWS

Yale & Towne Makes Wire Rope Hoists

PHILADELPHIA—The Yale & Towne Manufacturing Company is producing a new line of low-cost, low-capacity, wire rope hoists designed to bring the advantages of cable and drum hoisting to a wider industry group.

This new light-duty portable hoist will be known as the "Load King," and will be available in ¼, ½, and 1-ton capacities. Its frame is a heavy, one-piece, ribbed-steel casting constructed for use with lug, plain trolley, motor trolley, or winch-type mounting. The quick-lifting hoist is equipped with a large capacity drum with machine-cut grooves for guiding the cable as it winds without overlapping of cable. A specially-designed reversing-type motor is rated to operate under constant service with full load without destructive over-heating.

Literature on the new hoist, giving construction details, dimensional data, lift in feet, motor horsepower, and list prices is available from the Yale & Towne Manufacturing Company, Philadelphia Division, 4530 Tacony Street, Philadelphia 24, Pa. In writing for this bulletin, refer to bulletin P-1048.

Alnico Perma-Plate Magnets Developed by Dings

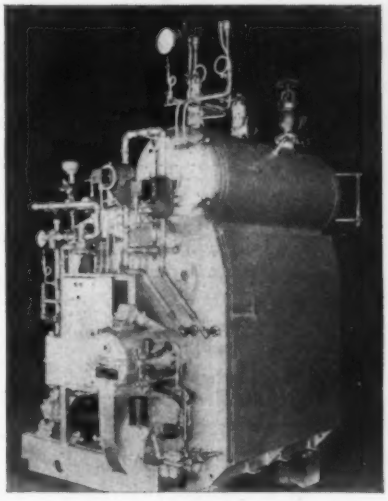
MILWAUKEE—A new line of permanent magnetic separators known as Perma-Plate Magnets for removing tramp iron from materials traveling down chutes or through ducts has been developed by Dings Magnetic Separator Company, 4740 W. McGeogh Ave. The magnets are intended for protection of grinders, crushers, stokers, pulverizers and other machinery susceptible to damage by iron.

Perma-Plate Magnets consist of a series of "C" shaped Alnico magnets the poles of which are secured to steel plates, and the entire assembly mounted on an aluminum plate. Installation is made by cutting away a section of the bottom of the chute and installing the magnet in its place. The magnet is mounted on hinges so that it can be swung away for removal of collected iron. The steel pole plates project up from the face of the magnet providing edges which help mechanically to arrest and hold the iron.

Standard units are available in a range of sizes 4 inches to 72 inches wide in increments of two inches. Special magnets can be built to suit requirements. The manufacturer guarantees magnetic permanence of the Alnico magnets for the life of the unit.

Foster-Wheeler Producing Package Steam Generators

NEW YORK—Foster-Wheeler Corporation has entered into the field of package steam generators up to and including 27,000 lb. per hour range. The units are assembled at the factory, including refractory and insulation, and are ready to generate steam when delivered and installed.



Designs immediately available provide for both oil and gas-firing, and a coal-fired unit will be ready shortly. Two series, low pressure (up to 250 lb.), and high pressure (up to 850 lb.), are being produced at present.

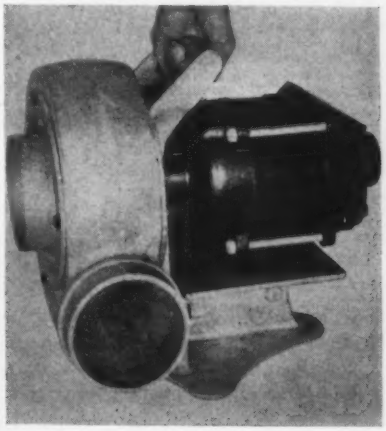
Basic engineering design provides for installation of superheaters either as original equipment or for later addition. This means that plant operators are being offered complete steam generators, factory-built, which embody the same features found in central stations units.

Combustion controls provide full or semi-automatic operation, as desired, and are an integral part of the "package." Operation of the units from a central control panel is simple—only a minimum of attention is necessary.

A bulletin containing full information is available on request from Foster-Wheeler Corp., 165 Broadway, New York, N. Y.

New Portable Ventilator Named "Saf-T-Air"

NEW YORK—Designed to save lives and improve worker efficiency by providing fresh air to men working in confined places, a new lightweight but powerful aluminum portable safety ventilator called "Saf-T-Air" is now being made available to the industrial world by its manufacturer, United Electric Motor Company, 178 Centre Street, New York City.



This new electric motor-driven ventilator has a capacity of 425 cubic feet per minute yet weighs only 50 pounds. One man can easily carry it by its balanced handle which has been placed over the center of gravity so that the unit can not tip over when carried or hung. Made of non-corrosive spark-proof aluminum, "Saf-T-Air" can be connected with the nearest lighting or power supply outlet without danger of overloading. Its compact size allows it to pass through small hatchways and hard to get to places.

As blower or exhauster, it is said to be excellent for eliminating hazardous gases, fumes, vapors, dust and foul-air from durms, vats, tanks, tank cars,

boilers, sewers, manholes, shipholds and other inaccessible places. More economical and versatile than stationary units, it is considered highly efficient on welding, spray-painting, tank-coating, and cargo-unloading jobs. Further details available in bulletin B148.

Otis Bulletins Pow-R-Truck Elevators

NEW YORK—A new descriptive folder on Otis Pow-R-Truck elevators engineered for use with materials handling equipment is now available from Otis Elevator Company, 260 Eleventh Avenue, New York City 1.

The eight-page illustrated booklet points out that freight elevators must be especially designed to stand up under the severe forces caused by industrial power truck loading where the truck itself may weigh 8,000 pounds or more, compared with a hand truck weighing about 500 pounds. (The relatively small pay loads of hand trucks, according to Otis, are pulled into elevators and distributed by hand, which permits gradual car loading. In contrast, a power truck, with its speed and proportionately heavier pay load, brings up problems of impact loading, off-balance loading and extra static or concentrated loading.)

Highlighted in the folder are the rugged design features incorporated in Otis Pow-R-Truck freight elevators to absorb punishment from power-driven materials handling equipment. Such factors as strengthening both the platform frame and diagonal bracing, special flooring, construction of the car frame, and use of special hoisting machines, full automatic elevator control and automatic micro self-leveling are discussed in detail and illustrated with diagrams. Also described are requirements for hoistway structures in industrial buildings, where extra hoistway strength is necessary for power truck loading.

Name your Machine and Jordan Chest Requirements
EAGLE-A
FAMOUS PAPERS
Warren Machine and Jordan Chest Pumps in operation at Riverside and Linden Divisions of American Writing Paper Corporation, Holyoke, Mass., manufacturers of famous Eagle-A Nationally Advertised Papers.

Warren Meets Every One!

SMOOTH FLOW: Unlike a plunger pump, the Warren Centrifugal gives smooth flow without pulsation.

REGULATION: Easily throttled, and unlike a plunger pump, the discharge valve may be closed without building up excessive pressure on pump and discharge line.

COMPACTNESS: Takes up less floor space and very much less head room than a plunger pump of equal capacity.

CLEAN STOCK: There are no pockets, as in a plunger pump, to hold stock from previous furnish.

ACCESSIBILITY: Diagonally split case makes it unnecessary to remove discharge piping. Rotating member easily lifted out.

MAINTENANCE: Low maintenance charges as compared with a plunger pump. Renewable liners prevent wear on suction heads. No large plunger stuffing boxes to be packed or to create friction on plungers. No plungers to be turned or replaced.

INITIAL COST: Lower than a plunger pump of much less capacity.

QUIET OPERATION: No gears making a continuous noise and creating vibration.

APPLICATION: Warren not only has the pump for this most vital service but the experience and ability to engineer its proper application.

Why not try a performance tested

Warren

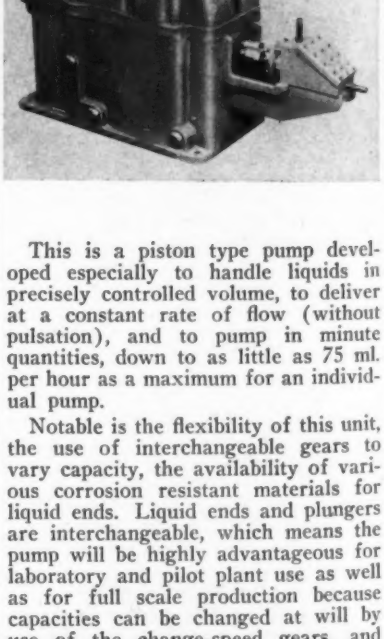
MACHINE CHEST PUMP

PP-51

Warren Steam Pump Company, Inc., Warren, Massachusetts

Milton Roy Previews Constametric Pump

PHILADELPHIA — Described as the answer to the need of chemical process industries for a pump that will operate at constant controlled flow without pulsation and in low capacities, the Milton Roy Constametric Pump which created much interest at the recent chemical exposition in New York is now bulletined by its manufacturer, Milton Roy Company.



This is a piston type pump developed especially to handle liquids in precisely controlled volume, to deliver at a constant rate of flow (without pulsation), and to pump in minute quantities, down to as little as 75 ml. per hour as a maximum for an individual pump.

Notable is the flexibility of this unit, the use of interchangeable gears to vary capacity, the availability of various corrosion resistant materials for liquid ends. Liquid ends and plungers are interchangeable, which means the pump will be highly advantageous for laboratory and pilot plant use as well as for full scale production because capacities can be changed at will by use of the change-speed gears, and liquid ends can be selected to meet practically any requirements.

LITERATURE

Versatility of Morden's Stockmaker Recounted

PORTLAND, Ore. — The outstanding performance of the Stockmaker in its versatile treatment of papers which vary from soft tissue to top-grade glassine is narrated in the latest booklet of the Morden Machines Company, Pacific Building.

Entitled "Controlled Flow," the booklet outlines the Morden method of controlled flow, describes construction and operation, and provides installation diagrams with variations to suit individual mill conditions.

Copes Performance At Hammermill Released

ERIE, Pa.—Boiler Water Level Control at Hammermill Paper Company planned originally to be in service during 1942 as additional power plant equipment was completed and began actual operation in 1947. General layout of the plant, significant data, photographs of the equipment installed, and graphs showing performance are contained in the Copes Performance Report, Bulletin 475, of the Northern Equipment Company, Erie, Pa., which is available for distribution.

Stainless Steel Castings Pioneered by Cooper

HILLSIDE, N. J. — Celebrating its quarter-century in the production of stainless steel castings, the Cooper Alloy Foundry Company has published an anniversary booklet entitled "A Quarter Century of Pioneering in Stainless Steel Castings," the story of America's leading stainless steel foundry and its work with corrosion and heat resistant alloys—a craftsmanship exhibit worthy its producer.

Divided into four sections, The Tale of a Pioneer, How Cooper Stainless Steel Castings Are Made, Cooper Stainless Steel Castings At Work, and Cooper Standard Alloys, it is at once a reference and handbook. Available through the Cooper Alloy Foundry Co., Hillside, N. J.

Taylor Forge Bulletin

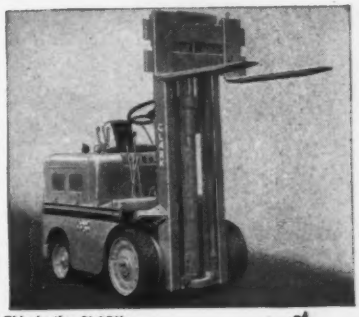
CHICAGO — Taylor Forge Bulletin 476, "Stainless Steel Dimensional Data," published by the Taylor Forge & Pipe Works, describes welded fittings from three-quarter inch to 12 inches, and lightweight American Standard flanges from three-quarter inch to 30 inches, all available in stainless types 304, 316 and 347, monel, inconel, nickel, copper and other usual industrial metals.

MATERIAL HANDLING News

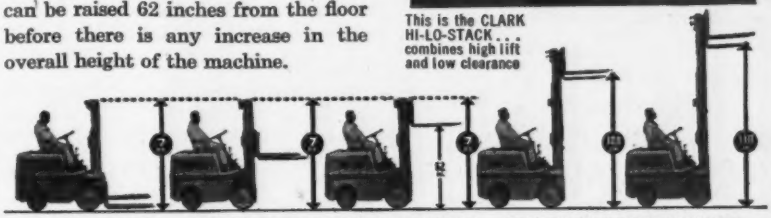
With this high-lift, low-clearance attachment, a Clark fork truck can take material through a freight car door and tier loads to the car roof, as well as tier loads rafter-high in the warehouse.

TIERING HEIGHT 130″ COLLAPSED HEIGHT 83″ FREE LIFT 62″

That "free lift 62 inches" is the vital specification of HI-LO-STACK, Clark's new high-lift, low-clearance attachment. It means that the forks can be raised 62 inches from the floor before there is any increase in the overall height of the machine.



This is the CLARK HI-LO-STACK . . . combines high lift and low clearance



83 INCHES OVERALL HEIGHT, FORKS LOWERED | NO CHANGE IN OVERALL HEIGHT WITH "FREE-LIFT" OF FORKS UP TO 62 INCHES | UP-UP-TO 130 INCHES—22 INCHES ADDITIONAL LIFT FOR EXTRA HIGH TIERING

You recognize instantly the practical benefits of the HI-LO-STACK—it enables a fork truck to take a load through the 7-foot door of a box-car and tier loads to the roof of the car, or to tier unit loads to the rafters in the warehouse. Heretofore, with conventional lift mechanisms, the increasing height of the vehicle made it impossible for the same machine to perform all these operations; making it necessary, in many handling operations, to use two machines—one for loading and unloading cars and another for high tiering in the warehouse.

Also HI-LO-STACK is an exceedingly simple mechanism. It has only one lift cylinder, and a single set of uprights with slide members inside. Lifting is accomplished with unusually low hydraulic pressure, which minimizes possibility of leakage.

It adds up that HI-LO-STACK is a typical Clark development—sturdily built, simple as can be, a thoroughly dependable unit; a good example of the sound engineering and incomparably rich knowledge of handling operations for which Industry looks to Clark. Write for particulars.

CLARK GAS AND ELECTRIC POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

CLARK EQUIPMENT COMPANY, TRUCTRACTOR DIVISION, BATTLE CREEK 58, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

IMPORTS

NEW YORK IMPORTS

WEEK ENDING JANUARY 24, 1948
SUMMARY

Newsprint	160 rolls
Paperhangings	11 bls., 3 cs.
Filter Paper	22 cs.
Drawing Paper	7 cs.
Paper & Envelopes	7 cs.
Parchment Paper	8 cs.
Crepe Paper	13 crates
Tissue Paper	14 cs.
Gummed Paper	92 cs.
Writing Paper	1 cs.

NEWSPRINT

Bankers Trust Co., Oscar Borjesson, Sundsvall, 160 rolls.

PAPERHANGINGS

W. H. S. Lloyd & Co., American Leader, London, 11 bls., 3 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., American Leader, London, 22 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., American Leader, London, 1 cs.
International Expediters, American Leader, London, 3 cs.
Stevens Nelson Paper Corp., American Leader, London, 3 cs.

PAPER & ENVELOPES

(———), American Leader, London, 7 cs.

PARCHMENT PAPER

Karr Ellis Co., American Leader, London, 2 cs.
George Lippelgoes, Midland Victory, Antwerp, 6 cs.

CREPE PAPER

(———), Media, Liverpool, 13 crates (Serviettes).

TISSUE PAPER

B. F. Drakenfeld & Co., Media, Liverpool, 14 cs. (pottery).

GUMMED PAPER

B. F. Drakenfeld & Co., Media, Liverpool, 92 cs.

WRITING PAPER

J. J. Gavin Co., American Banker, Havre, 1 cs.

RAGS, BAGGINGS, ETC.

Atlas Waste Manufacturing Co., Cape Alexander, Havana, 29 bls. cotton waste.
Brandwein Mazur Co., Skidmore Victory, Bombay, 300 bls. cotton waste.
Chase National Bank, Skidmore Victory, Genoa, 131 bls. old bagging.
Amicale Wool Service, Skidmore Victory, Genoa, 503 bls. old dark cotton rags.
A. W. Fenton Co., Skidmore Victory, Leghorn, 190 bls. dark cotton rags.
E. J. Keller Co., Inc., Skidmore Victory, Naples, 44 bls. dark cotton rags.
Riverside Mills, Mesa Victory, Fortaleza, 286 bls. cotton waste.
Continental Bank Trust Co., Honduras Victory, Venice, 58 bls. cotton rags.
E. J. Keller Co., Inc., Honduras Victory, Trieste, 220 bls. old rags.
Manufacturers Trust Co., Honduras Victory, Genoa, 294 bls. old waste bagging.
(———), American Leader, London, 67 bls. old cotton rags.
(———), Media, Liverpool, 21 bls. wool rags.
Amicale Wool Service, Neuva Fortuna, Montevideo, 6 bls. new wool rags.
New England Waste Co., Elg, Buenos Aires, 357 bls. cotton waste, 230 bls. pickers.
New England Waste Co., Jalaketa, Tuticorin, 2866 bls. cotton waste.
Riverside Mills, Tai Shan, Shanghai, 246 bls. cotton waste.
American Cotton Products Co., Tai Shan, Shanghai, 200 bls. cotton waste.
A. W. Fenton Co., Noah Brown, Naples, 387 bls. old dark cottons.
(———), Noah Brown, Naples, 138 bls. old dark cottons.
Amicale Wool Service, Noah Brown, Genoa, 440 bls. old dark cotton rags.
Concentra Shipping Co., Noah Brown, Genoa, 68 bls. old dark cotton rags.

CASEIN

New York Trust Co., Industria, Buenos Aires, 1200 bags.
Casein Co. of America Div. of The Borden Co., Elg, Buenos Aires, 2709 bags.
American Cyanamid Co., Mormacfir, Buenos Aires, 834 bags.
F. H. Paul & Stein Bros., Mormacfir, Buenos Aires, 500 bags (lactic).
Paul A. Dunkel, Mormacfir, Buenos Aires, 1000 bags (lactic).
Monite Waterproof Glue Co., Mormacteal, Buenos Aires, 500 bags.

GLUESTOCK, ETC.

Milligan & Higgins, Cape Alexander, Havana, 70 bls. gluestock.
Transatlantic Animal By-Products Co., Elg, Buenos Aires, 318 bags hidecuttings.
Darmstadt Scott & Courtney, Coastal Delegate, Vera Cruz, 107 bls. gluestock.
Darmstadt Scott & Courtney, Coastal Delegate, Tampico, 163 bls. hidecuttings.

WOODPULP

Cellulose Sales Co., Oscar Borjesson, Sundsvall, 2550 bls. air dry sulphite pulp.
(———), Oscar Borjesson, Sundsvall, 4445 bls. dry sulphite pulp.
Pagel Horton & Co., Inc., Oscar Borjesson, Sundsvall, 1524 bls. dry bleached sulphite pulp.

PULP BOARDS

(———), Pacific Stronghold, Avonmouth, 6 bls.

BOSTON IMPORTS

WEEK ENDING JANUARY 24, 1948

Herman Adlerstein, Skidmore Victory, Genoa, 30 bls. dark cotton rags.
S. H. Waldestein, Skidmore Victory, Bombay, 100 bls. cotton waste.
Ayres W. C. Jones, Midland Victory, Antwerp, 124 bls. cotton waste.
S. H. Waldestein, Tai Shan, Shanghai, 100 bls. cotton waste.

PHILADELPHIA IMPORTS

WEEK ENDING JANUARY 24, 1948

F. Weber, Honduras Victory, Genoa, 12 cs. drawing paper.

NORFOLK IMPORTS

WEEK ENDING JANUARY 24, 1948

A. DeVries Trading Corp., Saginaw Victory, Antwerp, 83 bls. old scrap bagging.

Philadelphia Quartz Appoints Pierce

PHILADELPHIA — The Philadelphia Quartz Company, manufacturer of silicates of soda, has added Albert C. Pierce to its sales staff. Mr. Pierce is soon to assume territorial duties in the metropolitan New York area.

Mr. Pierce has been a resident of Philadelphia for many years, having received his Bachelor's Degree in Geology from the University of Pennsylvania in 1939. He was a graduate assistant at Rutgers University for a year before World War II.

Discharged from the A.A.F. as a captain in January, 1946, he was associated with the U. S. Government Geological Survey in Baltimore. He joined the Philadelphia Quartz Company in August of last year and has completed technical training in the uses of silicates of soda in industry.

Everett W. Turley, previously sales representative in the New York area, has been transferred to Chicago with headquarters at the company's sales office, 205 W. Wacker Drive.

Evans Surveys Prospects In South America

NEW YORK — Robert H. Evans, assistant treasurer of Riegel Paper Corporation, has departed for Rio de Janeiro on the first leg of a survey tour of South America. Mr. Evans will spend the larger part of his time in Brazil and Argentina, returning to New York about March 1.

TRENDS

Office of the PAPER TRADE JOURNAL
Wednesday, January 28, 1948.

Woodpulp

Impact of the weather was felt in all phases of the industry this week but nowhere any worse than in the pulp market. Overseas shipments arriving at Atlantic ports during the week of January 17 totaled 3151 bales, contrasted with 43,991 for the same week of 1947. Total imports for the three weeks of January were 32,794 bales compared with 47,273 for the same period of 1947. Boston shipments were further plagued by the truck strike which rerouted one shipment of woodpulp to New London.

The United States Department of Commerce's preliminary report gives the following import figures for the year 1947: 1,497,230 tons from Canada, an increase of 263,764 tons; 556,-179 tons from Sweden, an increase of 111,065 tons; from Finland, 220,131 tons, an increase of 104,911 tons; 7854 tons from Newfoundland, an increase of 6985 tons; 9577 from Norway, 7342 from Mexico, and 4928 tons from Russia, all compared with none for 1946.

Prices have taken on a definite tone with a few more advances noted. The market is reported as firm and active with the supply unimproved on both chemical and mechanical types. Spot shipments are priced at $221 to $250 for prompt delivery of bleached pulp and $100 to $110 for groundwood.

Newsprint

United States newsprint production for the year 1947 totaled 816,151 tons against 772,797 tons for the year 1946, the Department of Commerce reports, or a gain of 43,354 tons. Newsprint purchases from Canada during the same year advanced to $342,000,000 in 1947 from $265,900,000 in 1946, a gain of $76,100,000, which represents a sizable increase in tonnage.

That this condition presents a sharp contrast to the plight of other countries is emphasized by an item carried in the WORLD'S PAPER TRADE REVIEW which compares the British newsprint dearth with the plenty seen by a visitor to the United States. "An edition of the New York Times for Sunday, November 9, looked more like a week's collection of all the British national dailies than one morning newspaper. The 266 pages were split into nine sections for convenient reading. Section one, comprising thirty-eight pages, was devoted to news; section two, twenty-four pages, covered drama, music, cinema, art, radio, etcetera; section three, fourteen pages, business; section four, a scant ten pages, sufficed for the editorial and correspondence; section five, twelve pages, reviewed the week's sport; sections eight and nine, twenty-four pages, comprised real estate; sections six and seven were, strictly speaking, supplements, one being a seventy-two page magazine with a heavy two-colored cover, the other, also seventy-two pages, was the book review. Here for fifteen cents was one U. S. Sunday newspaper."

This same journal reports of the low level of newsprint production in Britain which "gets off to a depressing start in 1948. Owing to the effects of the Scandinavian drought on pulp supplies, production by British newsprint mills will be reduced to 20 percent of capacity compared with the previous levels of 33⅓ percent. Over six months this means a loss to the newspapers of 47,000 tons of newsprint, a loss very nearly equivalent to the total imports permitted from Canada and Newfoundland in the same period. The new production figure of 20 percent is very nearly as low as the lowest wartime figure. Partly as a consequence of this reduction in production and partly as a result of the increase in the cost of pulp and other raw materials, the price of home-produced newsprint has been substantially advanced."

British home-produced newsprint is advanced to £46, 10s per ton for the machine finished grade, an increase of £9 per ton, the second substantial increase in six months. The average prewar price was eleven pounds per ton. In addition, an increase equal to £1, 13s, 4d per ton in the price of imported newsprint from Canada and Newfoundland has been allowed. As from January 5, 1948, the price for lightweight newsprint will be raised from £37, 10s per ton to £43 per ton, and the standard weight newsprint from £36, 12s, 6d to £42, 2s, 6d.

A further cut of newsprint consumption of 20 percent has been announced by the Australian Prime Minister to save dollars. This with the 30 percent cut already operating will make an overall reduction of 50 percent on dollar expenditures. This has resulted in heavy cuts in newsprint and, in some cases, loss of employment. In addition, newspapers had forfeited 15,000 tons of the balance of their 1947 newsprint imports.

Paperboard

Paperboard production is being maintained at a high level of capacity with a lowered backlog of orders. During the year 1947, this field of the industry reached an all-time production record of 21,028,898 tons, or a rise of 9.1 percent over the output of the preceding year, an increase made possible by high operating rate of existing equipment and by the new capacity completed during the year. It is reported that the peak in paperboard prices probably has been reached, despite the 10 percent increase in freight rates for waste paper, higher prices for pulp and a strengthening waste paper market; while another source believes a rise in kraft types by non-integrated mills will be followed by one from integrated mills.

It is expected that individual users of board and board products have now reestablished their inventories and that there naturally will follow a lessening demand for paperboard in the period directly ahead.

Waste Paper

Progressively worsening weather conditions have produced a strong market position for folded news as slowed collections and diminishing supplies plus a good demand produced firm prices. It is reported that there is not enough folded news to meet requirements. Likewise other low bulk grades are in short supply and steady demand, with prices holding. Packers report warehouses practically empty of waste papers, and it is believed that production requirements of the mills will be affected by these shortages if unfavorable collection weather persists; also that intensified demand might serve to strengthen prices.

Rags

New cuttings are reported dribbling into the market as the apparel houses recommence their cutting program, but in such negligible quantity that the supply condition remains tight. Since the mills do not appear to have reached a decision regarding production curtailment — the result of the slump in the rag-content field—the market may be described as "idling" until more cuttings appear and the demand picks up. Consumers are, however, reported as stiffening in the matter of price and better pack and buying only sufficient to sustain present production.

Index

The index of general business activity for the week ended January 17 rose to a new high of 158.2 from 155.8 in the preceding week, compared with 148.9 for the corresponding week of 1947. The index of paperboard production inclined to 195.5 from 184.5 in the previous week, compared with 180.8 in the same week in 1947.

Paper production for the week ended January 17 was estimated at 100.0 percent compared with 99.4 (revised figure) for the previous week, with 103.8 for the corresponding week of 1947, with 94.4 for 1946, and with 89.0 for the same week in 1946.

Paperboard production for the week ended January 17 was 104.0 percent of capacity, compared with 99.0 for the preceding week, with 103.0 for the corresponding week of 1947, with 93.0 for 1946, and with 94.0 for the corresponding week of 1945.

PRICES

With the elimination of price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market.

Paper

(Delivered New York)

Standard News, per ton—

Roll, contract	—	to	$96.00
Sheets	—	"	109.00

Kraft— per cwt.—Carload Quantities Zone A Deld. 40 lb. base wgt.

Superstandard Wrapping	$9.00	to	—
No. 1 Wrapping	6.75	"	—
Standard Wrapping	6.50	"	—
Standard Bag	6.25	"	—

Tissues—Per Ream 24x36 (480) 11 lb. Zone 1.

Wh. No. 1 Frd.	$1.75	to	$2.00
Wh. No. 1 M. G.	1.75	"	2.00
Wh. No. 1½	1.60	"	—
Wh. No. 2	1.55	"	—
Kraft Anti-Tar	1.38½	"	—
Kraft Unbl.	1.85	"	—
Manila No. 2	1.62	"	—

Toilet—Per Case of 100 rolls—1 lb. sheets.

Unbleached	$5.50	to	$6.40
Bleached	6.50	"	7.60

Paper Towels—Per Case of 3750—Zone 1.

Wh. Jr. M'tif'd 9¼x9½			$4.85
Br. Sr M'tif'd 10x12			3.45
Br. Jr. M'tif'd 9½x9¾			2.95
Br. Jr. Sgl. fold 10x10¾			3.10

Manila—per cwt.—C. l. f. a.

No. 1 Jute Tag	$14.50	to	—
Reg. Jute Manila	13.25	"	$15.50
No. 1 Manila	9.75	"	—

Boards, per ton—

Plain News	$92.50	"	—
Filled News	94.00	"	—
Plain Chip	90.00	"	—
Sgl. Mla. L. Chip*	100.0	"	102.50
White Pat. Coated*	120.00	"	—
Kraft Liners 42 lb.	100.00	"	—
Kraft Corr. .009	105.00	"	—
Binders Boards	126.00	"	—

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1: Rag Content Bonds and Ledgers—

White, Assorted Items Bonds, per cwt.

	Carton	4 C't'n	Ton
100% Rag Ext.			
No. 1	$55.00	$50.80	$48.70
90% Rag	48.25	44.55	42.70
75% Rag	38.00	34.55	33.10
50% Rag	31.50	28.75	27.50
25% Rag	28.00	25.50	24.50

Ledgers, per cwt.

100% Rag Ext.			
No. 1	$54.25	$50.00	$48.00
90% Rag	$47.50	$43.90	$42.10
75% Rag	37.50	34.55	33.10
50% Rag	32.25	29.40	28.25
25% Rag	28.75	26.15	25.10

Sulphite Bonds and Ledgers—White, Assorted Items Bonds, per cwt.

No. 1	$20.75	$18.75	$18.25
No. 2	19.75	17.75	17.25
No. 4	19.00	17.25	16.50

Ledgers, per cwt.

No. 1	$21.75	$19.60	$19.10
No. 2	20.75	18.75	18.05
No. 4	19.20	18.15	17.35

Free Sheet Book Papers—White, Cased Paper

(Per cwt.)	Case	Ton
No. 1 Glossy Coated	$20.40	$19.55
No. 2 Glossy Coated	19.15	18.30
No. 3 Glossy Coated	18.40	17.60
(Per cwt.)	Case	Ton
No. 1 Antique (Watermarked)	$15.90	$15.15
No. 2 Offset	14.15 to 17.90	13.65 to 17.10
A Grade E. F.	14.90	14.25
A Grade S. & S. C.	15.40	14.65
B Grade E. F.	Nominal	
B Grade S. C.	Nominal	

Wood Pulp

Domestic mill contract prices delivered with varying freight allowances.

	Per Short	ADT
Groundwood	$80.00 to	$81.00
Unbleached Sulphite	124.00 "	—
Bleached Sulphite	125.00 "	135.00
Bleached Soda	130.00 "	—
Bleached Sulphate	175.00 "	185.00
Unbleached Sulphate Northern	125.00 "	155.00
Unbleached Sulphate Southern	130.00 "	145.00

Canadian Quotations

Prices delivered with varying freight allowances unless otherwise specified:

	Per Short	ADT
Reg. No. 1 Kraft	125.00 "	—
Unbleached Sulphite	125.00 "	126.00
Bleached Sulphite	125.00 "	135.00
Glassine Unbleached Sulphite (no freight allowance)	120.00 "	—
Bleached Soda	130.00 "	—
Groundwood	80.00 "	85.00
Sideruns Pulping News	80.00 "	—
Hardwood and Specialty Grades	Nominal	

Swedish Quotations

On dock, Atlantic Ports

	Per Short	ADT
Bleached Kraft	175.00 "	185.00
Bleached Sulphite	175.00 "	185.00
Unbleached Sulphite	145.00 "	175.00
Unbleached Kraft	140.00 "	165.00

Finnish Quotations

On dock, Atlantic Ports

	Per Short	ADT
Bleached Sulphite	$185.00 to	—
Unbleached Sulphite	155.00 "	157.00
Unbleached Sulphate	147.50 "	—

New Domestic Cotton Cuttings

(F.O.B. Shipping Point Plus Dealer's Commission)

White Shirt	$12.00 to	—
Light Silesias	9.00 "	—
Unbleached Muslin	12.00 "	—
White Back Blue Overalls	9.00 "	9.25
Blue Overalls	8.00 "	—
Fancy Shirt	6.00 "	—
Light Percales	8.50 "	—
Light Prints	7.50 "	—
No. 1 Washables	5.00 "	—
Bleachable Khaki	7.00 "	7.50
Unbleachable Khaki	6.00 "	6.50
Cottonades	5.50 "	5.75

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.	
No. 1 Whites Repacked	$5.00 to	—
No. 1 Whites Miscellaneous	4.00 "	—
No. 2 Whites Repacked	3.50 "	3.75
No. 2 Whites Miscellaneous	3.00 "	—
Blue Overalls	3.75 "	—
Thirds and Blues Repacked	3.25 "	—
No. 1 Roofing Rags	1.90 "	—
No. 2 Roofing Rags	1.75 "	—
No. 3 Jute Bagging	1.60 "	—
No. 4 Brussels and hard back carpets	1.60 "	—
No. 5A Roofing Rags	1.80 "	—

New Foreign Cotton Cuttings

(Prices to Mill, F.O.B. Dock, N. Y.)

	Per 100 lbs.	
New Dark Cuttings	$5.50 to	$5.75
New Mixed Cuttings	6.25 "	6.50
Light Silesias	9.25 "	9.50
Light Flannelettes	9.25 "	9.50
New White Cuttings	12.00 "	—
New Unbleached Cuttings	12.25 "	—
Fancy Shirt Cuttings	6.50 "	7.00
Light Prints	7.75 "	8.00
Bleachable Khaki, No. 1	7.00 "	7.50
Unbl. Khaki, No. 1	6.25 "	6.75

Old Foreign Rags

(Prices to Mill, f.o.b. dock, N.Y.)

	Per 100 lbs.	
No. 1 White Linens	$14.00 to	16.00
No. 2 White Linens	12.00 "	13.00
No. 3 White Linens	8.00 "	9.00
No. 4 White Linens	8.00 "	9.00
No. 1 White Cottons	8.00 "	10.00
No. 2 White Cottons	7.00 "	8.00
No. 3 White Cottons	6.00 "	6.50
No. 4 White Cottons	4.00 "	4.50
Extra Light Prints	7.50 "	8.00
No. 1 New Light Prints	6.25 "	6.75
Med. Light Prints	5.25 "	5.75
Dutch Blue Cottons	5.25 "	5.50
Checks and Blues	4.00 "	4.25
Linsey Garments	3.00 "	3.75
Dark Cottons, European	2.20 "	2.60
Dark Cottons, Egyptian	1.75 "	2.00
Old Shopperies	2.50 "	3.00
New Shopperies	2.50 "	3.00

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs	
Foreign Gunny, No. 1	$5.75 to	$6.00
Domestic Gunny, No. 1	6.25 "	6.50
Light Wool Tares	6.00 "	6.25
Heavy Wool Tares	6.00 "	6.25
No. 1 Scrap Bagging	6.00 "	6.25
Foreign Manila Rope	6.00 "	6.75
Domestic Manila Rope	5.75 "	6.50
Jute Strings	5.00 "	5.25
No. 1 Sisal Strings	5.25 "	5.50
Mixed Strings	1.75 "	2.50
Mixed Strings, Outthrows	.90 "	1.10

Waste Paper

Base Prices to Mills for Average Packings

(Dollars Per Ton)
F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	155.00 to	165.00
No. 1 Hard White Envelope Cuts	145.00 "	155.00
No. 1 Hard White Shavings, unruled	145.00 "	155.00
No. 1 Hard White Shavings, ruled	110.00 "	130.00
Soft White Shavings, one cut	145.00 "	155.00
No. 1 Soft White Shavings	135.00 "	145.00
Soft White Shavings, Misc.	125.00 "	135.00
No. 1 Fly Leaf Shavings	45.00 "	—
No. 1 Groundwood Fly Leaf Shaving	35.00 "	—
No. 1 Heavy Books & Magazines	27.00 "	—
Mixed Books	15.00 "	20.00
No. 1 White Ledger	85.00 "	90.00
New Manila Envelope Cuttings, one cut	100.00 "	110.00
New Manila Envelope Cuttings	65.00 "	75.00
Extra Manilas	25.00 "	30.00
Mixed Kraft, Env. & Bag Cuttings	75.00 "	85.00
Kraft Envelope Cuttings	110.00 "	—
Triple Sorted, No. 1 Brown Soft Kraft	65.00 "	75.00
New Kraft Corrugated Cuttings	85.00 "	90.00
No. 1 Assorted Old Kraft	55.00 "	60.00
New Jute Corrugated Cuttings	27.00 "	—
Old 100% Kraft Corrugated Containers	45.00 "	50.00
No. 1 News	15.00 "	17.00
No. 1 Mixed Paper	11.00 "	13.00
Box Board Cuttings	12.00 "	14.00
White Blank News	75.00 "	80.00
Overissue News	18.00 "	20.00
Old Corrugated	25.00 "	27.00
Mill Wrappers	22.00 "	25.00

Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)

Coarse Polished—			
India	.31½	to	.32½
Fine India	.33¼	"	.37¾
Fine Polished—			
Unpolished—			
Paper Makers	.27	"	.28½
Tube Rope	.27¾	"	.29¾
Wrapping	.32	"	.34
Cotton	.55	"	.70

(Hard Fiber)

Mex. Sisal	.21	"	.31
Manila (Reprocessed)	.28	"	.30

(American Hemp)

Polished Hemp	.36¾	"	.42
Unpolished	.29¾	"	.34

PHILADELPHIA

Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

Shirt Cuttings—			
New White No. 1	.11	to	.12
New White No. 2	nominal		
Light Silesias	.07½	"	.08
Black Silesias, soft	.06½	"	.07
New Unbleached	.10½	"	.11¾
Washable Prints	.06½	"	.07
Washable No. 1	.05	"	.05½
Blue Overall	.07½	"	.08
Cottons—According to grades—			
Washable Shredding	.03½	"	.04
Fancy Percales	.06¾	"	.07¾
New Black Soft	nominal		
Khaki Cuttings—			
Unbleachable Cotton Cuttings	.06	"	.06½
Bleachable Cotton Cuttings	.07	"	.07½
Men's Corduroy	.05½	"	.06
Ladies' Corduroy	.05	"	.05½
Cottonades	.05½	"	.06

Domestic Rags (Old)

(F.O.B. Eastern Shipping Point)

White No. 1—Repacked	4.50	to	5.00
Mixed White	4.00	"	4.25
White No. 2—Repacked	3.50	"	3.75
Thirds and Blues—			
Miscellaneous	2.25	"	2.50
Repacked	2.75	"	3.00
Roofing Stock—			
Foreign No. 1	nominal		
Domestic No. 1	1.85	"	1.90
Domestic No. 2	1.75	"	1.80
Roofing Bagging	1.65	"	1.70
Old Manila Rope	6.25	"	6.50

Bagging

(F.O.B. Eastern Shipping Point)

Gunny No. 1—			
Foreign	nominal		
Domestic	4.75	to	5.25
No. 1 Clean Bright—			
Sisal Strings	.04½	"	.05
No. 2 Clean Bright—			
Sisal Strings	.03½	"	.04
Sisal Jute	.02½	"	.03
Scrap—			
No. 1	5.00	"	5.50
No. 2	2.50	"	3.00

Wool Tares, heavy	4.75	"	5.00
Jute Burlap Cuttings	6.00	"	6.50

Old Papers

(F. o. b. Phila.)
Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	to	$115.00
No. 1 Hard White Shavings, unruled	100.00	"	—
Soft White Shavings, one cut	90.00	"	95.00
White Blank News	70.00	"	75.00
Soft White Shavings	80.00	"	—
No. 1 White Ledger	85.00	"	90.00
Ledger, Colored	70.00	"	72.00
No. 1 Heavy Books & Magazines	24.00	"	26.00
Overissue Magazines	nominal		
New Manila Envelope Cuttings	80.00	"	—
No. 1 Assorted Old Kraft	60.00	"	65.00
No. 1 Mixed Paper	11.00	"	12.00
Box Board Cuttings	10.00	"	11.00
Kraft Corrugated Cuttings	90.00	"	100.00
Old Corrugated	24.00	"	26.00
Overissue News	20.00	"	22.00
No. 1 News	13.00	"	15.00

BOSTON

Old Papers

(F.o.b. Boston)
Mill Prices, Baled

No. 1 Hard White Shavings, unruled	6.25	to	6.75
No. 1 Hard White Shavings, ruled	6.00	"	6.50
Soft White Shavings, Misc.	5.25	"	5.50
No. 1 Fly Leaf Shavings	1.75	"	1.85
No. 2 Fly Leaf Shavings	1.65	"	1.75
No. 1 Groundwood Fly Leaf Shavings	1.75	"	2.00
No. 2 Groundwood Fly Leaf Shavings	1.50	"	1.75
Mixed Colored Shavings	2.00	"	2.25
New Manila Envelope Cuts, one cut	4.50	"	4.75
Hard White Envelope Cuts, one cut	6.00	"	6.50
Triple Sorted No. 1 Brown Soft Kraft	3.75	"	4.00
Mixed Kraft Env. & Bag Cuttings	4.00	"	4.25
Kraft Envelope Cuttings	3.75	"	4.00
No. 1 Heavy Books & Magazines	1.25	"	1.75
New Manila Envelope Cuts, one cut	—	"	—
New Manila Envelope Cuttings	4.00	"	4.25
White and Colored Tabulating Cards	4.00	"	4.50
Groundwood Tabulating Cards	1.50	"	1.75
White Blank News	2.25	"	2.50
No. 1 Assorted Old Kraft	3.50	"	—
No. 1 Mixed Paper	.65	"	.75
Overissue News	1.00	"	1.25
Box Board Cuttings	.60	"	.70
New Corrugated Cuttings, Kraft	2.75	"	3.00
Old Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.10	"	1.25
Jute Corrugated Cuttings	1.07½	"	—
Paper Strings	2.00	"	2.25

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	—	to	4.75
Domestic	—	"	4.75
Sisal Rope No. 1	6.00	"	—
Sisal Rope No. 2	5.50	"	—
Mixed Rope	5.25	"	—
Mixed Strings	2.00	"	2.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	3.50
Manila Rope—			
Foreign	(nominal)		
Domestic	6.25	"	—
Soft Jute Rope	5.00	"	5.25
Jute Carpet Threads	6.00	"	—
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	—	"	4.75
Domestic	—	"	4.87½
South America	5.25	"	—
Wool Tares—			
Foreign	4.75	"	—
Domestic	4.75	"	—
Aust. Wool Pouches	5.00	"	5.25
New Zealand Wool Pouches	5.25	"	5.50
New Burlap Cuttings	6.00	"	6.50
Heavy Baling Bagging	5.25	"	5.75
Paper Mill Bagging	3.50	"	3.75
No. 1 Roofing Bagging	1.75	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.08	to	—
Fancy Percales	.07½	"	.08
New White No. 1	.11	"	.11½
New Light Flannelettes	.08	"	.08½
Canton Flannels, Bleached	.10	"	.11
Underwear Cutters, Bleached	.10	"	.11
Underwear Cutters, Unbleached	.11	"	.12
Silesias No. 1	.08	"	.08½
New Black Silesias	.05	"	—
Red Cotton Cuttings	.05	"	—
Blue Overalls	.08½	"	.09
Soft Unbleached	.11	"	.12
Blue Cheviots	.08½	"	.09
Fancy	.06	"	—
Washable	.06	"	—
Khaki Cuttings	.06½	"	.07½
Corduroy	.03½	"	—
Khaki Canvas	.06¼	"	.06½
B. V. D. Cuttings	.10½	"	.11½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	to	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	2.00	"	—
No. 2	1.75	"	2.00
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	6.00	"	—

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
Mill Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	$140.00	to	$150.00
No. 1 Hard White Shavings, unruled	110.00	"	120.00
No. 1 Soft White Shavings	90.00	"	100.00
No. 1 White Ledger	85.00	to	90.00
No. 1 Heavy Books & Magazines	30.00	"	35.00
White Blank News	65.00	"	70.00
Mixed Kraft Env. & Bag Cuttings	80.00	"	90.00
No. 1 Assorted Old Kraft	35.00	"	40.00
Overissue News	23.00	"	—
No. 1 News	18.00	"	19.00
No. 1 Mixed Paper	13.00	"	14.00
Old Corrugated	20.00	"	—
Mill Wrappers	15.00	"	—

MARKETS

BLANC FIXE—No change in market. Demand continues strong. Pulp is currently quoted at $85 in bags, car lots at works, 6 cents per lb., l.c.l., deld.; by-product $72.50 per ton, car lots at works, 6 cents per lb., l.c.l., deld.

BLEACHING POWDER — Market near a balance. Active demand. Supply improves. Prices range from $3.75 to $4 per 100 pound drums, l.c.l., works.

CASEIN — Market approximately unchanged. Slight softening on imported product. Buying weak. Domestic production unsettled. Stocks inadequate. Current prices on processed acid precipitated casein at 33 to 35 cents per pound for domestic grades and 29 to 32 cents for imported grades, f.o.b. shipping point.

CAUSTIC SODA — Demand shows seasonal easing. Supply extremely short. Solid caustic is reported at $2.85 per cwt.; flaked and ground is quoted at $3.25 per cwt. in 400 pound drums, $3.75 per cwt. in 100 pound drums—car lots at works; liquid 50% in tank cars at $2.25 per cwt.; liquid 73% in tank cars at $2.35 per cwt. at works.

CHINA CLAY—Condition good. Domestic grades in good supply; filled, $10 to $13 per ton, car lots; coating clay is $15 to $30. Imported clay demand good. Supply improved. Quoted $16 to $35 short ton, export warehouse.

CHLORINE—Supply condition unimproved with easing seen as temporary slackening of demand. Prices unchanged. Currently quoted at $2.25 per cwt. in single unit tank cars, and at $2.55 to $3.75 per cwt. in multi-unit tank cars, f.o.b. works.

ROSIN—Trading light. Prices firm. Gum rosin in drums per 100 pounds net in yard. New York car lots B, D, $9.75; E, F, $10.50; G, H, I, K, M, N, $10.75; WG, $11.10; WW, $11.20. Wood rosin, per 100 pounds, net, f.o.b., l.c.l., N. Y., B, $6.45; FF, $7.95; G, H, I, $10.39; K, $10.41; M, $10.47; N, $10.64; WG, $10.95; WW, $11.05.

SALT CAKE—Demand continues ahead of supply with slight improvement in shipments. Prices unchanged. Domestic salt cake is quoted at $20 to $26.

SODA ASH—Demand strong. Seasonal relaxation produced temporary easing. Market tight. Shipments only against contracts. Current prices, car lots, per 100 pounds, are as follows: in bulk, $1.10; in paper bags, $1.30; and in barrels, $1.80.

SODIUM BICARBONATE — Supply approximately abreast the demand. Shortage of box cars delays shipment. Reported as $1.85 per cwt. paper bags, carload lots.

STARCH—Market strong and active following price rise. Production improved considerably. Export light. Pearl grade quoted at $7.31 per 100 pounds, powdered starch at $7.42 per 100 pounds, car lots, New York.

SULPHATE OF ALUMINA — Supply steady. Prices unchanged. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is quoted at $2 per 100 pounds in bags, car lots, at works.

SULPHUR—Prices unchanged. Supplies ample. Annual contracts are quoted at $16 to $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf ports is $17.50 to $19.50 per long ton.

TALC—No change in domestic market. Demand far in excess of supply. Domestic grades are currently quoted at $21 per ton in mines; Canadian at $35 and up per ton. All prices in car lots.

TITANIUM DIOXIDE — Demand strong. Extremely tight supply with no early easing seen. Anastase 17½c lb. carload lots, 18-18½c l.c.l.; rutile 19½c lb. carload lots, 20-20½c l.c.l.; 50-lb. bags, f.o.b. plant, minimum freight allowance.

DIGESTED

"The free enterprise system—the profit and loss system of business, is never going to be understood by the masses until the facts are presented in simple and understandable language. This is the time for plain talk between nations. This is the time for plain talk between voters and governmental officials who represent them. This is the time for plain talk between employers and employees. Business men must re-establish employee confidence in the integrity and capacity of business and industry. The time and opportunity are here now, today, for business and financial leaders to function in the public interest and recapture leadership of public, employee and political thought. This is the time for direct action and forthright leadership. An opportunity, if muffed, may never return. Unless management is successful in interpreting itself, its policies and the reasons behind its ways of doing business, the battle will be lost. Unless management is successful in winning back the support and respect of a majority of its employees, none of the other areas of public influence is worth bothering about.—Col. WALTER DELONG, Weyerhaeuser Timber Co., from an address before the Truck Loggers Association, Vancouver, B. C.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1947		Corresponding Weeks—1946	
December 13	110.1	December 14	106.7
December 20	110.6	December 21	101.8
December 27	74.9	December 28	71.8
January 3, '48	100.3	January 4, '47	96.3
January 10, '48 (revised)	99.4	January 11, '47	102.6
January 17, '48	*100.0*	January 18, '47	103.8

COMPARATIVE MONTHLY SUMMARIES

1946				1947			
Jan.	94.7	July	94.0	Jan.	102.1	July	93.5
Feb.	98.4	Aug.	104.7	Feb.	105.9	Aug.	104.2
Mar.	104.4	Sep.	101.3	Mar.	106.1	Sep.	102.0
Apr.	102.7	Oct.	106.4	Apr.	105.1	Oct.	109.5
May	100.7	Nov.	105.5	May	106.2	Nov.	109.3
June	104.6	Dec.	97.0	June	106.0	Dec.	101.5
		Year Avg.	101.1			Year Avg.	*104.3*

COMPARATIVE YEARLY SUMMARIES

	1941	1942	1943	1944	1945	1946	1947
Year Average	97.4	90.4	87.8	88.1	89.4	101.1	*104.3*

PAPERBOARD OPERATING RATIOS†

Current Weeks—1947		Corresponding Weeks—1946	
December 13	100	December 14	102
December 20	100	December 21	102
December 27	77	December 28	66
January 3, '48	78	January 4, '47	85
January 10, '48	99	January 11, '47	102
January 17, '48	*104*	January 18, '47	103

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1946	90	91	100	99	94	97	89	99	96	100	99	92	96
1947	99	103	101	100	101	101	90	99	96	101	99	89	*98*

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Base capacity increased 13.3% as of January 10, 1948.

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EDITORIAL

Iron Curtain

An audience as realistic in its points of view as any in the paper industry sat up and listened intently when the speaker arrested their attention with the words "Iron Curtain." For he was talking to them about their own problems, and these British Columbia Truck Loggers had never thought of it before in quite that light. But Walter DeLong, public relations counsel for the Weyerhaeuser Timber Company made his point. Then he showed how appreciation of the problem, leading to search for a method to solve it, can be turned to account. At least it is possible, he showed, to keep a corner of the curtain lifted.

There is much talk, he declared, about the cold war that is being carried on, and it is war just as much a war as that between the Allies and the Axis. This is ideological warfare, to make supreme and everlasting one of two opposing concepts of government—communism or capitalism. Everywhere people seem to be struggling with the terrible dilemma of whether to attempt the solution of economic problems by political action or by the devices of the free enterprise system. Private enterprisers have allowed themselves to be maneuvered into a position where they appear to oppose the good life. Business men, he said, seem to be afraid to display their good motives for fear they will be making a promise. Business management simply has not marshalled its facts and put them in simple form before the public. Business has hesitated to put its best foot forward. Business has been on the defensive. Business has committed the unpardonable sin of apoligizing for making profits. Business men themselves have failed to present and define the profit system. They have failed to call it what it really is—the free enterprise system of profit and loss.

Pied Pipers labor have developed the technique of dropping an iron curtain between the employes and the management, the management who must supply the work, the jobs, the pay.

The first job management has to do, argues Col. DeLong, is to acknowledge the fact that it does not know how the worker acts or reacts, and that it is management's job to find out. It requires special channels of communication to bring the worker's point of view to management. One of the most experienced labor arbitrators in the United States estimates that more than two-thirds of all grievances would never arise if management only knew in advance what is likely to be the worker's reaction to a move, or what in the way of working conditions is important to the worker.

Beyond his immediate interest in his work and product, the worker has a real interest in the plant in which he is employed and of which, as a rule, he knows almost nothing. He is interested in its organization, its policies, its history, its financial status, its markets. In short, in pretty nearly everything that goes on. He desires understanding—understanding will make him a better employee.

"By lifting the iron curtain between employer and employee, he declared, "by understanding of each other's problems, by putting labor-management relation on a partnership basis we can bring industrial peace such as we have never had before. We have done well on this North American continent, but we can do better. We haven't begun to live as we can live in this land if we will just keep our heads and stay at work."

Prospective Plenty

Prospects appear to be bright for another twelve months' capacity operations of Canadian pulp and paper mills, at least as far as adequate supplies of wood are concerned. Well informed sources this week decalred the 1947-48 cutting season is now about two-thirds over in Eastern Canada, which comprises Manitoba, Ontario, Quebec and New Brunswick. Prospects for a total cut slightly in excess of the 1946-47 cut are considered quite favorable. The total cut for that year was approximately nine million. This was a new peak for all time for Eastern Canada.

Since the return of men from war services the labor situation in the woods operations has gradually improved. During the fall and winter season of 1942-43, for instance, the cut was down to approximately six million cords. Special efforts to improve the labor forces have been made since that time, with the cooperation of the federal department of labor. Some thousands of displaced persons from Europe have been admitted to Canada, particularly during the last year, many of whom were available for pulpwood cutting.

The only uncertainty now seems to be whether or not there will be an adequate flow of water in the rivers when spring comes to get all the pulpwood to the mills. Nowadays, when some mills have to go farther afield for their supplies, much pulpwood is hauled to the mills by the railways, but the great standby for most mills is the pulpwood that is floated down the innumerable rivers and lesser streams. The water flow is difficult to forecast at this time because in most sections of Ontario, for instance, the fall precipitation was less than usual, while the snowfall, as measured in inches by the weather services, has been greater than usual during the winter months to date.

W. L. Cook

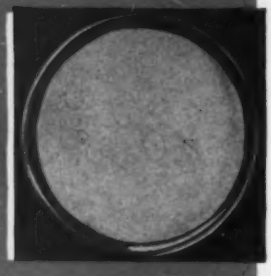
Editor

The bugs can be...

in

or

out



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I

The p
index re
tion of
the indi
TRADE
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journal,
tion of
of the
given.

No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
No. 7
No. 8
No. 9
No. 10
No. 11
No. 12
No. 13
No. 14
No. 15
No. 16
No. 17
No. 18
No. 19
No. 20
No. 21
No. 22
No. 23
No. 24
No. 25
No. 26

Adams,
plied
Aiken,
water
153
Axe, h

Bailey,
heat
Baker,
drive,
Barnes,
Bauer,
resina
Bechtel,

SECTION OF THE

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No. 1	July 3	1- 12
No. 2	July 10	13- 24
No. 3	July 17	25- 36
No. 4	July 24	37- 48
No. 5	July 31	49- 60
No. 6	Aug. 7	61- 72
No. 7	Aug. 14	73- 80
No. 8	Aug. 21	81- 92
No. 9	Aug. 28	93-104
No. 10	Sept. 4	105-116
No. 11	Sept. 11	117-128
No. 12	Sept. 18	129-140
No. 13	Sept. 25	141-152
No. 14	Oct. 2	153-164
No. 15	Oct. 9	165-176
No. 16	Oct. 16	177-188
No. 17	Oct. 23	189-200
No. 18	Oct. 30	201-212
No. 19	Nov. 6	213-238
No. 20	Nov. 13	239-250
No. 21	Nov. 20	251-262
No. 22	Nov. 27	263-274
No. 23	Dec. 4	275-286
No. 24	Dec. 11	287-298
No. 25	Dec. 18	299-310
No. 26	Dec. 25	311-322

AUTHOR INDEX

A

Adams, R. R. Treatment of surface water supplied for pulp and paper mills, 287
Aiken, W. H. Factors affecting measurement of water vapor permeability at low temperatures, 153
Axe, E. J. See Rudolfs, W.

B

Bailey, H. P., and Nadelman, A. H. Alkali and heat recovery in deinking systems, 13
Baker, R. R. Heat balance and the paper machine drive, 9
Barnes, Norman F. Spectrophotometry, 239
Bauer, E. S. Methods for combining phenolic resins and paper, 28
Bechtel, W. G., and Kesler, C. C. Applications of starch viscosity to the paper industry, 177
Bergendahl, C. J., and Libby, C. E. Beater sizing with the silicones, 108
Blockman, A. F. See Salley, D. J.
Brauns, F. E., and Yirak, Jack J. The decomposition of methylated sprucewood, 135
Bray, Mark W., and Martin, J. Stanley. Sulphate pulping of Douglas fir, western hemlock, Pacific silver fir, and western red cedar logging and sawmill waste, 182
—— and Singer, Bernard. Influence of sodium sulphite and sodium thiosulphate in the sulphate pulping of Engelmann spruce, 81
Brown, R. M. General study of kraft mill instrumentation, 61

C

Cass, C. E. Centralized planning and control of plant layouts, 311
Clemens, Robert F. Modern recausticizing plant practice, 263
Crosson, John W. Technical merchandising of paper, 16
Croup, A. H. The papermakers interest in color, 248

D

Distelhorst, S. D. Modern methods of feedwater conditioning for high pressure boiler plants, 51
Dries, M. J. See Naponen, G. E.

E

Evans, Ralph M. Description and specification of color, 251
Eyler, R. W., and Hall, R. T. Determination of carboxylmethylcellulose in paper, 165

F

Foss, Carl E. Color order systems, 281
Fuller, R. R. Instrumentation for pulp and paper mill operation, 101

G

Gough, J. B. Supercalender roll deflections and crowns, 213
Green, Henry. How to determine the desirable rheological properties of coatings, 117
Green, Ralph E., Sams, Robert H., and Wills, John H. The effect of the adhesive on the quality of paperboards. I. Measurement of the glue-line strength of corrugated board, 45

H

Hall, R. T. See Eyler, R. W.
Hannah, Martha L. See Harris, Elwin E.
Harris, Elwin E., Hannan, Martha L., and Marquardt, Ralph R. Production of fodder yeast, 270
Horsey, Eleanor F. Sodium carboxymethylcellulose for papermaking, 40
Hufnagel, W. M. Chain and its application in pulp and paper mills, 275
Hyttinen, Axel, Mackin, G. E., and Schafer, E. R. Experiments on the grinding of quaking aspen and use of pulp in printing paper, 141

J

Johnston, Henry D. Dandy roll drive for fine paper manufacture, 69

K

Kesler, C. C. See Bechtel, W. G.
Kingsbury, H. Pump maintenance, 173

L

Lathrop, E. C. Economics of straw utilization, 91
Lester, Ivan L., and Lyons, S. C. Testing of clays for paper machine and brush coating, 189
Libby, C. E. See Bergendahl, C. J.
Little, John R. The stake of the strawboard industry in Rule 41, 321
Lyons, S. C. See Lester, I. L.

M

Mackin, G. E. See Hyttinen, A.
Marquardt, Ralph R. See Harris, Elwin E.
Martin, J. Stanlet. See Bray, M. W.
Meller, Alexander. The cold alkaline purification of wood cellulose. II. The influence of surface properties on resistant pentosans, 125
Merritt, H. C. The suction roll of today, 299
Muench, Carl G. An outline of the insulation board industry, 58

N

Nadelman, A. H. See Bailey, H. P.
Naponen, G. E., Dries, M. J., and O'Brien, A. S. Micro-iodometric method for the determination of glue or gelatin in paper, 55
Nelson, Richard. Spot conversion drives in paper mills, 121
Nickerson, Dorothy. Interrelation of color specifications, 219

O

O'Brien, A. S. See Naponen, G. E.
Oliner, A. W., and O'Neil, F. W. The properties of flexible impregnated sheets, 73
O'Neil, F. W. See Oliner, A. W.

P

Pew, J. C. See Schwartz, S. L.
Pitzer, J. C. Paper for plastic laminates, 37
Pollak, Arthur, and Wiley, Paul R. The fuel and soda value of tall oil skimmings, 97
Poor, E. N. Nonfibrous raw materials report—1946, 129
Price, D. Studies of rosin sizing. II. The effect of alumina on rosin sizing, 256

R

Rahr, Frederick H. Color engineering, 105
Renner, Maynard S. Sources of variability in water vapor permeability determinations, 65
Rudolfs, Willem, and Axe, Earl J. Variations and similarities of paperboard mill white waters, 31

S

Salley, D. J., and Blockman, A. F. Study of wet-strength mechanism. The effect of melamine resin on the bonding of paper, 3
Sams, Robert H. See Green, R. S.
Saunders, Daniel J. New applications for boiler feedwater treatment equipment, 25
Schafer, E. R. See Hyttinen, A.; Schwartz, S. L.

Scribner, B. W. Developments in testing of paper and paperboard—1945-1946, 1
Schwartz, S. L., Pew, J. C., and Schafer, E. R. Experiments on the production of insulating board and hardboard from western sawmill and logging waste, 159
Seborg, C. O., and Simmonds, F. A. Additional data on the recovery of wet pulp mats from compressive deformation, 169
Simmonds, F. A. See Seborg, C. O.
Singer, Bernard. See Bray, M. W.
Sippola, A. L. Paper mill lubrication—drier bearing circulation systems, 292
Smith, Hillard L. See Stahl, B. F.
Snodgrass, Maynard H. Modern bark burning, 319
Stahl, B. Franklin, and Smith, Hillard L. Treatment for prevention of decay in stacked straw, 296

T

TAPPI. Bleeding resistance of asphalted paper at elevated temperature, 238
——. Melting point of petrolatum, 250
——. Organic nitrogen in paper, 49
——. Specific gravity (or density) and moisture content of pulpwood, 93
Tobey, J. E. A fuel engineering study of some recent boiler installations in the pulp and paper industry, 301

V

Van den Akker, J. A. The I. C. I. standard observer and co-ordinate system and their use in studies of the color of paper, 19
——. See also Wink, W. A.

W

Warner, J. E. A. Is B.t.u. accounting worthwhile in the power plant, 279
Wells, Sidney D. Progress in alkaline pulping in 1946, 206
West, Clarence J. United States patents on papermaking, third quarter, 1947, 196
Wiley, Paul R. See Pollak, A.
Wills, John H. See Green, R. E.
Wink, Willmer A., and Van den Akker, J. A. Penetration of water in insulation board, 86

Y

Yirak, Jack J. See Brauns, F. E.
Young, G. H. Steam supply and control arrangements for driers, 314

SUBJECT INDEX

A

Alkaline process
  See also Kraft process, Sulphate process
  Review, 1946, 206
Alum
  Review, 1946, 131
  Water treatment, use in, 288
Alumina, effect in sizing, 256
Ammonium carboxymethylcellulose, sizing with, 42

B

Bark
  Burner for, 319
  Coal and, as fuel, 319
Bearings, drier, lubrication, 292
Beater, chain drive, 277
Beating
  Fiber bonding by resins, effect on, 7
  Hemicelluloses in pulp, effect on, 127
  Pulp viscosity, effect on, 127
  Resistant pentosans in pulp, effect on, 127
Beer's law, 244
Black spruce sulphate pulps, properties of, 185
Bleaching, instrumentation in, 62
Board mills, stream pollution and, 31
Board testing
  Review, 1945-1946, 1
  Water penetration, 86
    Dry indicator method, 88
Boards
  Bonding strength test, 45
  Corrugated, glue-line strength, determination of, 45
  Douglas fir waste, 159
  Insulation
    History of, 58
    Manufacture, 58
    Raw materials, 59
  Western hemlock waste, 159
Boilers
  Fuel-burning equipment, 301
  Types of, 306
Book review
  Air conditioning, 269
  Coating and ink resins, 116
  Colloid science, 274
  Control charts in factory management, 247, 291
  Electrical engineering problems, 72
  Encyclopedia of chemical technology, 300
  Flameproofing textile fabrics, 274
  Fundamentals of successful manufacturing, 80
High speed mathematics, 274
Industrial experimentation, 298
Industrial quality control, 54
Manual for process engineering calculations, 269, 286
Natural waxes, 64
Paper in the making, 168
Phenoplasts, 27
Practical emulsions, 68
Standard costs for manufacturing, 152
Successful manufacturing, 18
Theory of statistics, 298
Titration methods, 255
Water soluble gums, 68
Bouguer's law, 244
Buna N in paper-base plastics, 74

C

Carbohydrates, possible combinations with lignin, 135
Carboxymethylcellulose
  See also Ammonium carbomethylcellulose, Sodium carboxymethylcellulose
  Paper, determination in, 165
Casein, review, 1946, 131
Celotex, 59
Chains
  Direction of travel, 275
  Identification numbers, 275
  Rivetless, 276
  Roller, 277
  Selection, basis of, 276
  Silent, 277
  Uses of, 275
Chlorine, review, 1946, 130
Chromaticity diagram, 20
Chromaticity scale, 220
Clay
  Brightness, determination of, 191
  Dispersant requirement, determination of, 194
  Moisture, determination of, 193
  Particle size, determination of, 190
  Testing methods, 189
  Viscosity, determination of, 192
Coal
  Bark and, as fuel, 319
  Buying, factors in, 309
  Quality, 306
Color
  Absorption law, 244
  Description of, 22, 251
  I.C.I. data, graphing methods, 220
  ISCC-NBS method of designation, 230
  Munsell system, 253
  Paper maker, interest of, 248
  Physical characteristics, 240
  Program, steps in, 106
  Selection, 252
  Standards, 249
  Textile Color Card Association standards, 231
  Tolerance specifications, 234
Color analysis, spectrophotometry in, 241
Color appearance systems, 281
Color curves, 19
Color engineering, 105
Color Harmony Manual, 231, 253
Color matching, 248, 254
  Spectrophotometry in, 241
Color mixture systems, 281
Color order systems, 281
Color perception, 240
Color specifications, 254
  Interrelation of, 219
Color system, I.C.I., 253
Colorant mixture system, 281
Colorimetric purity, 21
Consistency, types of, 117
Conveyor, chain, 276
Cork board, 58
Corn Industries viscometer, 179
Corn syrup, review, 1946, 134
Corrosion
  Baling wire by sodium pentachlorophenate, 297
  Recausticizing plant, 263
Couch rolls, suction, 299
Cylinder couch roll, suction, 300

D

Dandy roll
  Drive, 69
  Paper formation, effect on, 69
Das Papier (magazine), 284
Daylight, energy distribution, 239
Deinking
  Alkali consumption in, 13
  Liquors for, 14
  Steam economy in, 15
Diatomaceous earth
  Process water filtration on, 202
  White water filtration on, 201
Digester instrumentation, 62
Dominant wave length, 21
Douglas fir sulphite pulps, shrinkage and surface tension, 172
Douglas fir waste
  Boards from, 159
  Chemical analysis, 184
  Sulphate pulps, properties of, 185
  Sulphate pulping, 182
Drier
  Chain drive, 277
  Steam supply, 314
    Control of, 214
  Yankee, steam supply, 316
Dri-film sizing, 108
Drive
  Dandy roll, 69
  M-G system, 121
  Paper machine, heat balance and, 9
  Spot conversion, 121
  Types of, 10
  Variable speed, 122
Drum press, suction, 299
Drum rolls, suction, 299
Drying
  Hemicelluloses in pulp, effect on, 127
  Pulp viscosity, effect on, 127
  Resistant pentosans in pulp, effect on, 127
Dyestuffs, review, 1946, 132

E

Electromagnetic spectrum, 239
Engelmann spruce
  Properties, 82
  Sulfate process, use in, 81
Enzymes, review, 1946, 132
Ewart malleable chain, 275
Excitation purity, 21

F

Feed water
  Chemical characteristics, 51
  Demineralization, 53
  Softeners for, 52
  Zeolite softener, 52
  Zeolite treatment, 25
Felt rolls, suction, 300
Fiberfelt, 59
Filtration in water treatment, 290
Flaxinum, 58
Flocculation in water treatment, 288
Fuel
  See also Coal
  Bark, use of, 319
  Burning equipment, 301
  Pulverizers, 302
  Stokers, 302
  Tall oil skimmings, value of, 99
Furnace, bark burning, 319

G

Gelatin, determination in paper, 55
Glue
  Paper, determination in, 55
  Review, 1946, 131
Glycerin, review, 1946, 133
Glycolic acid, determination of, 166
Glycols, review, 1946, 134
Goniophotometry, 243
Greaseproofing, sodium carboxymethylcellulose for, 41
Green liquors
  Clarification, 268
  Lime, slaking of, 264

H

Heat energy distribution in power plants, 279
Holzforschung (magazine), 284
Hydrogen ion concentration, control in water treatment, 290

I

I.C.I. co-ordinate system, 20
I.C.I. Standard Observer, 19
I.C.I. system of color, 253
Instrumentation
  Data, reporting of, 102
  Kraft mill, 61
  Pulp and paper mills, 101
  Recausticizing plant, 268
Insulite, 59
Inter-Society Color Council, 248
Invert sugar, review, 1946, 133

J

Jack pine
  Sulphate pulps, properties of, 185
  Sulphite pulp, recovery from compressive deformation, 171

K

Kraft mill, instrumentation in, 61
Kraft process
  Recausticizing plant, 263
  Review, 1946, 206
Kraft pulp
  Bleaching, review, 1946, 209
  Washing, review, 1946, 208

L

Lignin
  Carbohydrates, possible combinations with, 13
  Methanol, from methylated sprucewood, 138
  Phenol, from methylated sprucewood, 138
Lime
  Classification in recausticizing plant, 265
  Green liquor, slaking with, 264
  Review, 1946, 129
Lime sludge
  Filtration, 267
  Reburning, 267
Tray thickener for, 265
  Washing, 267

E. Eng. Lib
Wash

White liquor, separation from, 265
Lith, 58
Logging waste, board from, 159
Lovibond glasses, 233
Lovibond-Schofield color system, 234
Lubrication
  Circulation method, 292
  Drier bearings, 292
Luminous reflectance, 22

M

Maerz and Paul Dictionary of color, 231
Masonite, 59
Maxwell triangle, 220, 223
Mechanical pulp
  Mats, recovery from compressive deformation, 170
  Quaking aspen, 141
  Properties, 144
Melamine resins, role in fiber bonding, 3
Methylsilicone oil, sizing with, 110
M-G drive system, 121
Munsell Book of color, 229, 253

N

Nitrogen, organic, determination in paper, 49
Nomographs, fuel and chemical values of tall oil skimmings, 98

O

Oswald color system, 231

P

Pacific silver fir waste
  Chemical analysis, 184
  Sulphate pulping, 182
  Sulphate pulps, properties of, 185
Packaged drives, 121
Paper
  Asphalted, bleeding resistance test, 238
  Formation, effect of dandy roll drive, 69
  Merchandising program, 16
  Paper-base laminates, use for, 37
  Printing, aspen pulp in, 141
  Shear adhesion tests, 4
  Silicone-sized, properties of, 114
  Strength, effect of melamine resins, 4, 9
  Synthetic resins, methods of addition, 28
  Water-vapor permeability, 153
  Wet strength, 4
Paper base laminates, 73
  Heat curing, effect of, 77
  Paper for, 37
  Phenol-formaldehyde resins, 28
  Physical properties, 76
  Resin addition, methods of, 28
Paper defects, relation of supercalender rolls, 216
Paper industry, applications of I.C.I. system, 23
Paper machine drive, 9
Paper mill
  Chains, use of, 275
  Instrumentation in, 101
Paper testing
  Asphalted paper, bleeding resistance, 238
  Carboxymethylcellulose, 165
  Gelatin, 55
  Glue, 55
  Organic nitrogen, 49
  Review, 1945-1946, 1
Particle size, determination, 190
Patents, United States, 196
Petrolatum, melting point, determination, 250
Photometer, 242
Pipes
  Drier steam supply, 314
  Pumps, 174
Plant layout, function and planning, 311
Plasticizers, review, 1946, 133
Polyvinyl acetate in paper base laminates, 74
Polyvinyl acrylate in paper base laminates, 74
Polyvinyl butyral in paper base laminates, 74
Polyvinyl chloride in paper base laminates, 74
Polyvinylidene chloride in paper base laminates, 74
Power plant
  B.t.u. accounting system, 279
  Heat energy distribution, 279
Press rolls, suction, 300
Pulp
  Cold alkaline purification, 125
  Hemicellulose, beating and drying, effect of, 127
  Resistant pentosans, beating and drying, effect of, 127
  Viscosity, beating and drying, effect of, 127
Pulp mats, recovery from compressive deformation, 169
Pulp mill
  Chains, use of, 275
Instrumentation in, 101
Pulp washing, instrumentation in, 62
Pulpwood
  Density, determination of, 93
  Green volume, determination of, 93
  Moisture, determination of, 93
Pulverizers, fuel, 302
Pumps, maintenance, 174

Q

Quaking aspen, mechanical pulping, 141

R

Recausticizing plant
  Chemical loss in, 269
  Functions, 263
  Instrumentation in, 268
  Lime, role of, 264
Rheology, outline of, 117
Ridgway color dictionary, 233
Rosin
  Review, 1946, 131
  Silicones and, sizing with, 109
Rule 41
  History, 321
  Revision, 321
  Strawboard industry, relation to, 322

S

Salt cake, review, 1946, 130
Scotch pine, sulphate pulp, properties of, 185
Sedimentation in water treatment, 288, 289
Silicones, sizing with, 108
Sizing
  Alumina, effect of, 256
  Ammonium carboxymethylcellulose, 42
  Dri-Film, 108
  Methylsilicone oil, 110
  Rosin and silicones, sizing with, 109
  Silicones, 108
  Sodium aluminate, effect of, 259
  Sodium bicarbonate, effect of, 260
  Sodium carboxymethylcellulose, 41
  Sodium hydroxide, effect of, 261
  White water, effect of, 260
Small color difference formulas, 235
Sodium aluminate, effect on sizing, 259
Sodium bicarbonate, effect on sizing, 260
Sodium carbonate, review, 1946, 129
Sodium carboxymethylcellulose
  Greaseproofing agent, 41
  Properties, 40
  Sizing with, 41
Sodium hydroxide
  Deinking, requirements for, 13
  Review, 1946, 129
  Sizing, effect on, 261
Sodium pentachlorophenate
  Straw preservation with, 296
  Wire corrosion by, 298
Sodium peroxide, review, 1946, 130
Sodium silicate, review, 1946, 130
Sodium sulphite, effect on sulphate process, 81
Sodium thiosulphate, effect on sulphite process, 81
Sorbitol, review, 1946, 134
Spectrophotometers, types of, 241
Spectrophotometry, 241
  Scales for data, 246
Spectrum locus, 21
Spencer dandy roll drive, 69
Spot conversion drives, 121
Sprucewood
  Methylated
    Decomposition, 135
      Lignin content, 138
      Methanol lignin from, 138
      Phenol lignin from, 138
      Sodium hydroxide, action of, 139
  Methylation, 137
Starch
  Conversion, factors in, 179
  Enzyme conversion, 180
  Review, 1946, 131
  Viscosity, determination of, 177
Statistical analysis, water-vapor permeability, 66
Steam
  Deinking, requirements for, 15
  Driers, supply to, 314
Stokers
  Boilers, 302
  Types in use, 302
Straw
  Collection problems, 91
  Decay, prevention of, 296
  Sodium pentachlorophenate for preservation, 296
  Statistics, 92
  Utilization, 91
Strawboard, Rule 41 and, 322
Stream pollution, board mills and, 31
Styrene-acrylonitrile in paper base laminates, 74
Suction rolls, 299
Sulphate process
  Sodium sulphite, effect of, 81
  Sodium thiosulphate, effect of, 81
Sulphate pulp
  Compressive deformation, recovery from, 172
  Engelmann spruce, 81
  Mats, recovery from compressive deformation, 169
Sulphite pulp, recovery from compressive deformation, 172
Sulphite waste liquor
  Fodder yeast from, 270
  Magnesia base, fodder yeast from, 270
  Waldhof fermenter for, 271
Sulphur, review, 1946, 130
Sulphur dioxide, review, 1946, 130
Supercalender roll
  Crown curves, shape of, 215
  Deflection and crown, 213
    Calculation, 214
  Paper defects, relation to, 216
Synthetic resins
  Beater addition, 73
  Paper base laminates
    Methods of addition to, 28
    Use in, 75
  Review, 1946, 132

T

Tall oil
  Review, 1946, 208
  Skimmings
    Black liquor in, 98
    Fuel value, 97
    Soda value, 97
TAPPI Standards
  T 18 m-47, 93
  T 418 m-47, 49
  T 475 m-46, 238
  T 634 m-47, 250
  Change in status, 247
Ten-Test, 59
Textile Color Card Association color standards, 231
Titanium pigments, review, 1946, 132
Torula utilis, growth on sulphite waste liquor, 270
Tray thickener, white liquor, 265
Trichromatic coefficient, 20
Tristimulus value, 20
Turbine, paper machine drive, 9

U

Urea, review, 1946, 134

V

Veneer waste, boards from, 159
Viscometers, 178
  Rotational, 119
  Types, 118
Viscosity
  Clay, determination of, 192
  Pulp, effect of beating and drying, 127
  Starch, determination of, 177
Vision, nature of, 251

W

Waldhof fermenter, 271
Waste paper, deinking, 13
Water
  Silicone sizing, effect on, 113
  Southern United States, 287
  Surface, treatment of, 287
Water treatment
  Diatomaceous filter aids, 201
  Filtration, 290
  Flocculation, 288
  Hydrogen ion concentration control, 290
  Sedimentation, 288, 289
  Sterilization, 288
Watermarks, effect of dandy roll drive, 69
Water-vapor permeability
  Composite barriers, 154
  Low temperature, measurement of, 153
  Statistical analysis, 65
  Temperature, effect of, 155
Wax sizes, review, 1946, 133
Western hemlock waste
  Boards from, 159
  Chemical analysis, 184
  Sulphate pulping, 182
  Sulphate pulps, properties of, 185
Western red cedar waste
  Chemical analysis, 184
  Sulphate pulping, 182
  Sulphate pulps, properties of, 185
Wet strength
  Beating, effect of, 7
  Fiber bonding, role in, 5
  Mechanism, 3
  Silicones, effect of, 115
Wetting agents, effect on compression of pulps, 171
White fir waste, board from, 159
White liquor
  Clarification, 265
  Tray thickener for, 265
White water
  Board mills, 31
    B.O.D., 32
    Composition, 32
    Fiber losses, 34
  Diatomaceous filter aids, 201
  Sizing, effect on, 260
  Tissue mills, 35
  Stream pollution and, 31
Wood sugar
  Foaming, prevention of, 272
  Fodder yeast from, 270
Wratten filters, 234

Y

Yankee drier, steam supply to, 316
Yeast, fodder
  Sulphite waste liquor, production from, 270
  Waldhof fermenter for, 271
  Wood sugar, preparation from, 270

Z

Zeoltie softener for feedwater, 25, 52
Zinc sulphide, review, 1946, 132

Clay-Water Suspensions Discussed at Delaware Valley Section

Bernard K. Asdell of the Edgar Brothers Company was the speaker at the meeting of the Delaware Valley Section of TAPPI Thursday night, January 22. About sixty attended the dinner and discussion which was held at the Engineers Club in Philadelphia.

Mr. Asdell discussed only the rheological properties of clay-water suspensions as basic to the understanding of the properties of clay coating mixtures. Clay particles were described as hexagonal plates, the chemical composition of which consists of alternate layers of silica and alumina bound together through oxygen and hydroxyl valence linkages. These particles bear a negative charge, accounted for by the "diffuse double layer" theory, and this charge is a controlling factor in the dispersion of clay.

It was shown that particle size distribution is a very important factor in the consideration of the rheological characteristics of clay and that by its control it is possible to prepare grades that have the properties desired in clay for paper coating.

The following were in attendance:

A. L. Andrews, Bernard K. Asdell, Raymond J. Aspinall, N. E. Bartlett, R. T. Bingham, J. M. Booth, R. H. Bowers, H. C. Brill, Olin W. Callighan, John Carson, C. M. Connor, O. C. Cordes, R. T. De Pan, J. C. Dieffenderfer, W. P. Dohne, John H. Elliott, P. C. Evanoff, James S. Evans, Jeanne H. Fisher, Frederick W. Goetz, Lois Hans, J. C. Harper, Jr., S. T. Jamison, H. C. Kinne, Jr., Geo. D. Knight, William Kurlish, Louis Lang, Harry J. Larra, Daniel J. Lorden, J. Macadam, J. C. Marrone, D. Kenneth McCendy, Louise E. McGrath, Lambert F. Minucci, Edward C. Molin, John T. Moss, N. Ness, J. H. Purcell, C. H. Rice, N. K. Schlotterbeds, Joseph J. Schwenkler, Edw. A. Shallcross, Chas. A. Shubert, R. A. Sloman, Clarke E. Snook, Geo. H. Spencer, Lionel M. Sutherland, G. Raymond Tomlinson, Roy Underdown, R. H. Walsh, A. E. Waugh, Kingdon Watt, John P. Weidner, Ray Wilcox, W. R. Willets.

TAPPI Notes

Gervase C. Blick, formerly of the American Can Company, is now with the John Strange Paper Company.

V. Edwin Ware, formerly of Sitroux, Inc., is now plant engineer for San-Nap-Pak Mfg. Company, Rockland, Del.

Robert P. Anderson, formerly of the Institute of Paper Chemistry, is now in the technical control department, St. Regis Paper Company, Pensacola, Fla.

C. A. Bentz, formerly of the D. M. Bare Paper Company, is now in the technical service department, General Chemical Division, Allied Chemical & Dye Corporation, Edgewater, N. J.

William C. Birdsey is now paper mill manager, The Pioneer Division, The Flintkote Company, Los Angeles, Calif.

Rutger Larson, production manager, A/B Stjernfors, Stalldalen, Sweden is now visiting mills in the United States.

Miss Karin Wilson, chemical engineer, Cellulose Research Department, Uddeholms A/B, Skoghall, Sweden, has been awarded a traveling fellowship by the Royal Technical University of Stockholm and will visit mills and laboratories in the United States and Canada.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Alfred R. Askin, Engineering Student, Marathon Paper Mills of Canada Ltd., Marathon, Ontario. Attended the University of Toronto.

Edmond S. Bauer, Assistant Sales Manager, Monsanto Chemical Co., Springfield, Massachusetts, a 1939 graduate of Newark College of Engineering.

Charles A. Bicking, Quality Control Engineer, Hercules Powder Co., Wilmington, Delaware, a 1931 graduate of Massachusetts Institute of Technology, with an M.S. degree.

Frederick W. Binns, Chemical Engineer, Virginia Smelting Co., Boston, Massachusetts, a 1921 graduate of Massachusetts Institute of Technology.

James E. Brennan, Chief Research Chemist, Ecusta Paper Corp., Pisgah Forest, North Carolina, a 1933 graduate of Holy Cross College.

W. K. Cahn, Managing Proprietor, Wings & Co., Hongkong, China, a 1928 graduate of Senshu University, with an M.S. degree.

Earnest P. Cook, Assistant Chief Engineer, Brown Company, Berlin, New Hampshire.

Percival J. J. Cox, Development Engineer, Hummel & Downing Co., Milwaukee 1, Wisconsin, a 1940 graduate of Michigan College of Mining and Technology, with an M.S. degree in 1942.

John C. Darrah, Chemical Engineer, Penobscot Chemical Fibre Co., Great Works, Maine, a 1920 graduate of the University of Maine.

Irving V. Earle, Jr., Chemist, The Upson Co., Lockport, New York, a 1934 graduate of the New York State College of Forestry.

Robert Gardner, Vice-President, Gardner Gibbons Printing Co., Philadelphia, Pennsylvania. Attended the University of Pennsylvania.

Kenneth E. Glidden, Chief, Pulping Section, Institute of Paper Chemistry, Appleton, Wisconsin, a 1932 graduate of Johns Hopkins University, with a Ph.D. degree.

John H. Goldberger, Research Chemist, Ecusta Paper Corp., Pisgah Forest, North Carolina, a 1931 graduate of the Technical University of Vienna.

William G. Gray, Plant Engineer, St. Marys Kraft Corp., St. Marys, Georgia. Attended College of Applied Science, Syracuse University.

Andrew Gruenwald, Partner, Gruenwald & Niemitz, Engineers, Long Island City, New York, a 1920 graduate of Bruno College.

J. Roberts Harrower, Laboratory Director, Avoset Company, San Francisco, California, a 1935 graduate of the University of Wisconsin.

Maurice L. Hobday, Mill Manager, The Imperial Paper Mills Ltd., Gravesend, Kent, England. Attended Dover College.

L. Randall Hollinger, Engineer, Mobile Paper Mill Co., Mobile, Alabama, a 1943 graduate of the University of Alabama.

Thomas D. Johnson, Jr., Salesman, E. I. duPont de Nemours & Co., Inc., San Francisco, California, a 1940 graduate of Princeton University.

Edward T. Jones, Principal Assistant, Chas. T. Main, Inc., Boston, Massachusetts, a 1914 graduate of Worcester Polytechnic Institute.

Morris Kaplan, Manager-Treasurer, Mercer Paper Tube, Inc., Trenton, New Jersey, a 1931 graduate of Boston University.

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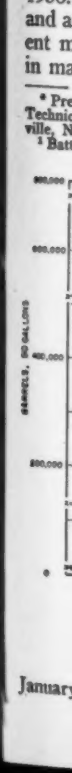

January

Chemical Uses of Sulphate Turpentine*

By P. O. Powers[1]

Abstract

The production of sulphate turpentine has increased approaching that of gum turpentine. Consumption is unaccounted for but it is apparent that it is being utliized by the chemical industries. The author considers the potential use of turpentine and suggests possible outlets.

The production of sulphate turpentine has been greatly increased during the last few years and, according to the reported production for 1945, was approximately equal to the production of wood turpentine or about one-half the production of gum turpentine. Thus, sulphate turpentine accounted for about 25% of the total production of turpentine in the United States. It would be more accurate to refer to the amount of sulphate turpentine recovered for it is known that less than complete recovery of sulphate turpentine is achieved at many mills. The production statistics supplied by the Department of Agriculture since 1937 are shown in Fig. 1. It has been estimated that the 1946 production of sulphate turpentine may have been at least 200,000 barrels which would approach the production of gum turpentine.

The reports of the consumption of turpentine are far from complete since only about 25% of the apparent United States consumption is accounted for. However, one trend is quite clear from the use figures; namely, the rapidly increasing utilization of turpentine in the chemical industries. This is coupled with an apparent continuous decline in the use of turpentine in the paint and varnish field. With the larger percentage of turpentine consumption unaccounted for, it cannot be clearly ascertained whether the use of turpentine as a thinner has greatly declined or not. It may be surmised that some decrease in the use of turpentine may have occurred, but not a decrease to about 30% of the volume in this field in 1936. Improved petroleum solvents of high efficiency and at considerably lower cost than turpentine at present market prices, have certainly replaced turpentine in many paints and varnishes.

* Presented at the meeting of the Chemical Products Committee of the Technical Association of the Pulp and Paper Industry, held in Asheville, N. C., Oct. 10, 1947.

[1] Battelle Memorial Institute, Columbus, Ohio.

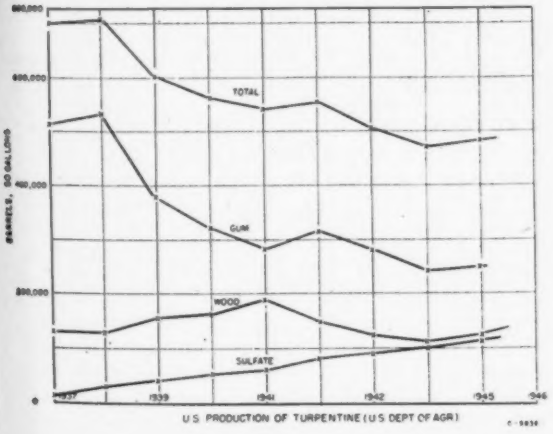

FIG. 1
U. S. Production of Turpentine

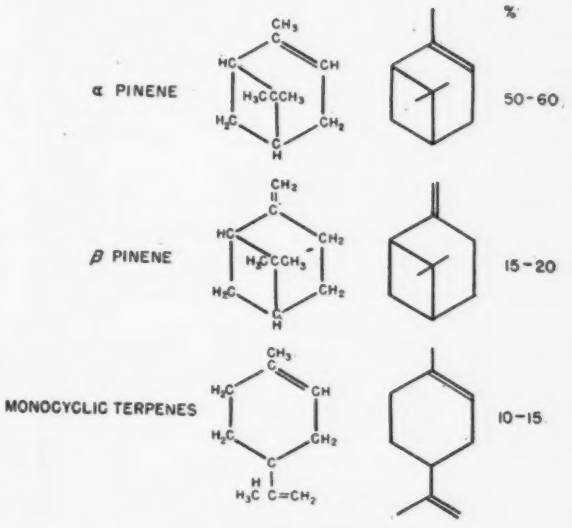

FIG. 2
Composition of Sulphate Turpentine (Norton)

The trend to chemical uses revealed by the statistics, incomplete as they may be, is believed to be significant and to be indicative of the future trends in turpentine consumption. Turpentine offers a valuable raw material for chemical manufacture since it can be readily separated into hydrocarbons of high purity which possess a high reactivity and can be used as starting material for a variety of useful chemical products.

The price of turpentine is, of course, a factor in its consumption in chemical markets. The wide fluctuations in the price of turpentine have, without doubt, hindered its development in chemical fields. Assurance of large quantities of turpentine at a stable and reasonable price will go far to insure the development of chemical markets. The outstanding growth of the wood rosin and turpentine production in the naval stores field has, in part, resulted from such a policy. The price of turpentine in recent years has lacked any apparent correlation to its value as a paint thinner or as a chemical raw material.

As will be shown, there are many possible outlets for turpentine and its components in chemical uses in a variety of fields. Some of these uses are now well established and will continue to expand. Other promising outlets have not been fully developed, and many other potential outlets probably exist which are now unknown.

It should be pointed out that the rapid expansion of the chemicals from petroleum has already been felt in the solvent field. Also the production of isoprene which originally was largely from turpentine is now almost exclusively from petroleum. Since isoprene is in a sense the simplest terpene, the possibility of extension to at least some of the higher members of the series would appear to be possible.

Composition of Sulphate Turpentine

Little has been published on the composition of sulphate turpentine. An estimate by Norton *(17)* of the composition is shown in Fig. 2.

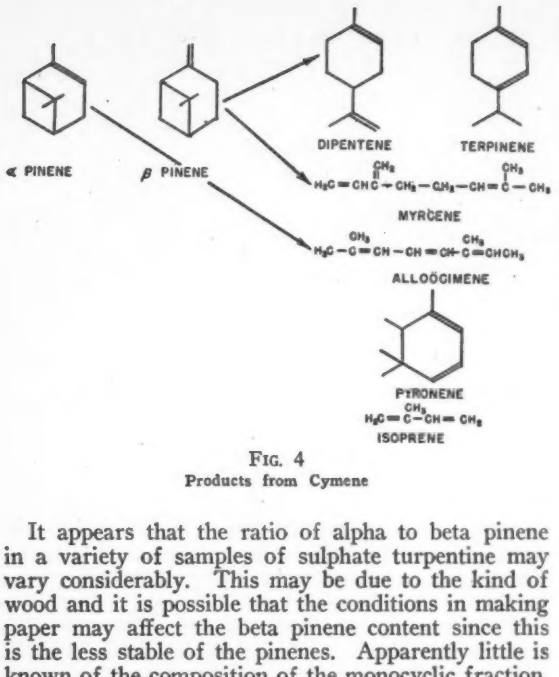

FIG. 4
Products from Cymene

It appears that the ratio of alpha to beta pinene in a variety of samples of sulphate turpentine may vary considerably. This may be due to the kind of wood and it is possible that the conditions in making paper may affect the beta pinene content since this is the less stable of the pinenes. Apparently little is known of the composition of the monocyclic fraction, although presumably this is largely dipentene. The composition of the sulphur compounds also has apparently never been carefully investigated. The yields of turpentine vary considerably depending on the type of wood processed and obviously on the efficiency of the recovery system. It is believed that much higher yields of turpentine could be realized in many instances with better recovery systems.

Present and Potential Uses of the Pinenes

Alpha and beta pinene are reactive hydrocarbons that can be readily converted into a wide variety of materials. Among the changes that can be made on the pinenes are hydration to terpineol or the terpinyl ethers, isomerization to dipentene or camphene, polymerization to the diploymer and to higher polymers, and addition of the pinenes to a wide variety of organic compounds. Many of these reactions are now carried out in large volume to produce a variety of commercial products including synthetic camphor, several types of commercial resins including alkyl and phenolic resins, special solvents, flotation agents, and insecticides. There are also many applications where terpenes can be satisfactorily employed but for numerous reasons are not extensively used today. Some of the present day and potential uses are shown in Table I. Both types of applications will be considered below.

Thermal Treatment of Pinenes

Dipentene is somewhat higher boiling than turpentine and is a better solvent for many resins. It is used with fast-drying paints to inhibit skinning in the package.

Dipentene, and other monocyclic turpenes, are formed by isomerization of the pinenes with strong acids. Heat isomerization also has been used to form the dipentene *(18)*. Dipentene may also be used in chemical reactions.

When the pinenes are heated to higher temperatures, alloöcimene and myrcene are formed in addition to dipentene. At 200°C. a small amount of alloöcimene and also a small yield of the pyronenes *(11, 12)* are formed in addition to dipentene, which is the principal product.

Alloöcimene appears to be formed from alpha pinene and myrcene from beta pinene. Both are branch chain C_{10} hydrocarbons with three double bonds. Myrcene has been used as one of the starting materials for synthetic rubber. Both myrcene and alloöcimene polymerize readily to form highly unsaturated hydrocarbons which dry on exposure to air. The products from heat treatment of the pinenes are shown in Fig. 3.

When higher temperatures are employed, dipentene breaks up to give isoprene *(28)*. This is one of the starting materials for butyl rubber, and isoprene can be used in making other synthetic rubbers. Because of the low yields of isoprene and the formation of a variety of byproducts, isoprene from the pinene has not been competitive with petroleum isoprene. Production of isoprene today is exclusively from petroleum.

When heat is used to isomerize the pinenes, alpha and beta pyronene are formed. These hydrocarbons have apparently not been extensively studied. Their use as solvents or as raw materials for synthetic reactions offer several possibilities. They are apparently more stable than the monocyclic terpenes.

Cymene

Sulphate turpentine on heating with dehydrogenation catalysts *(3)* is converted into cymene in high yields. Some of the methods for utilization of cymene are shown in Fig. 4.

This hydrocarbon can be used as a starting material for dimethyl styrene, paramethylacetophenone, and for cumic acid *(19)*. Dimethyl styrene does not polymerize readily but can be copolymerized with a variety of vinyl compounds to give synthetic resins *(20)* and synthetic rubbers. Methyl acetophenone is a valuable perfume chemical, and cumic acid can be used for the preparation of plasticizers.

Polymers and Addition Products

The pinenes polymerize readily in the presence of a wide variety of acid catalysts. Usually only soft

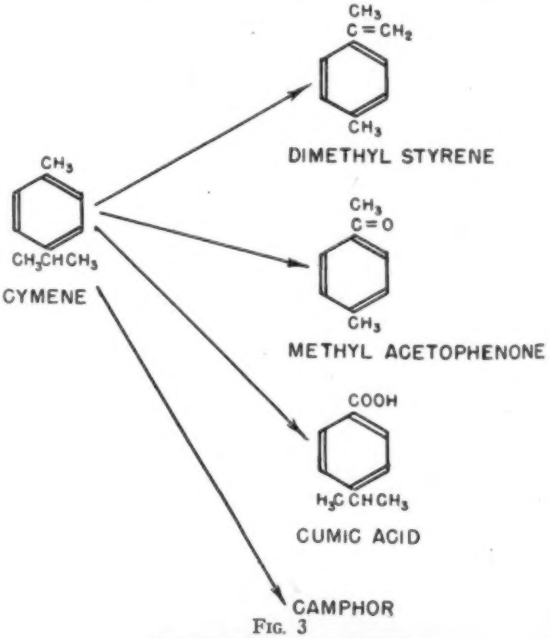

FIG. 3
Heat Treatment of the Pinenes

oily products are formed consisting chiefly of the dipolymer formed by addition of two molecules of the terpene. While such oils are readily made, no significant commercial uses for the dipolymer have developed. In thin films, it dries slowly to a hard, but rather brittle film. It has been suggested that partial dehydrogenation might yield a drying oil, and hydrogenation *(29)* a plasticizer.

The structure of the dipolymer has not been entirely clarified although the polymers from the pinenes and dipentene have much the same physical properties *(8)*. Trimethyl phenanthrene *(22)* has been found when dipentene is dehydrogenated with sulphur, but apparently the phenanthrene derivative is formed during the dehydrogenation.

It has been found that hard resins can be formed

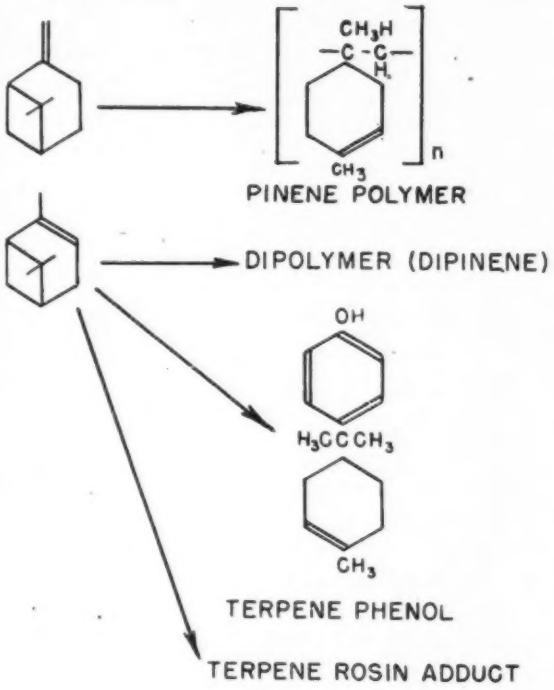

FIG. 5
Polymers and Adducts

by the polymerization of the pinenes in the presence of acid catalyists as aluminum chloride or boron fluoride. Beta pinene forms a much higher polymer *(5)* and soft oils are not produced to any large extent. Thus, to produce a high-melting resin from the pinenes, a high content of beta pinene must be employed. Terpene resins produced in large quantities have found widespread uses in the paint and varnish field, the adhesive field, and in rubber compositions.

Several of the polymerization and addition products of the terpenes are shown in Fig. 5.

The terpene condenses readily with rosin in the presence of acid catalysts *(25)*. It has been found that rosin and beta pinene in the presence of BF_3 yield a resin with a somewhat higher melting point than rosin. It is possible to condense the terpene with a phenol formaldehyde resin *(23)* or the terpene may be added to phenol and the addition product may be condensed with formaldehyde to produce a resin *(10)*. Several of the resin producers offer terpene-phenolic resins for manufacture of paints and varnishes. Dipentene and turpentine have both been used to prepare resins of this type.

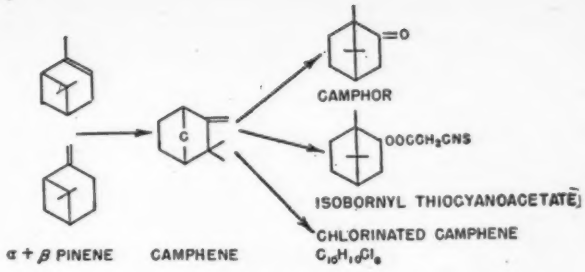

FIG. 6
Products from Camphene

In some instances a relatively small amount of phenol has been introduced into the terpene resin to give resins which are more widely miscible *(6)*.

Camphene

Synthetic camphor consumes a large quantity of the pinenes both in this country and abroad. The pinenes are isomerized to camphene *(7, 10)* which is esterified by organic acids to isobornyl esters which can be readily hydrolyzed to isoborneol. This is dehydrogenated to give camphor. It is also possible to convert pinene directly to isobornyl esters, but other esters are formed in this reaction *(4)*.

A somewhat simpler, although less efficient method of producing camphor, is by the hydration of cymene *(27)* which, as shown above, can be readily obtained from sulphate turpentine. Figure 6 shows some of the products which may be derived from camphene.

Organic thiocyanates have been found to be active insecticides, and their use has greatly expanded in recent years. Terpene thiocyanates have been found to be effective against flies, mosquitoes, and other insect pests. Isobornyl thiocyanoacetate may be made from camphene or from alpha and beta pinene. Since the camphene is readily produced by isomerization of the pinenes, they are the starting point in either method.

Many chlorinated compounds have been found to be active insecticides; chlordane, benbene hexachloride, and D.D.T. come readily to mind. It has recently been shown that the chlorination of camphene yields an effective insecticide. The hexachloride, $C_{10}H_{10}Cl_6$, has been found *(1)* to be effective against grasshoppers, aphids, and other insects.

Terpenes and Maleic Anhydride

Maleic anhydride reacts readily with most of the terpenes. The adducts with rosin and with cyclopentadiene are used in commercial alkyd resins. Petrex resins are derived from monocyclic terpenes and maleic anhydride. Other terpenes, including the pinenes *(21)* react readily with maleic anhydride or fumaric acid as isoprene, myrcene, and alloöcimene *(24)*.

It has been shown *(9)* that pinene and other terpenes can be oxidized to maleic anhydride, thus, the maleicterpene adducts could be derived entirely from

TABLE I.—CHEMICAL USES OF PINENES

Synthetic Camphor
Synthetic Resins
  Alkyds
  Terpene Phenolics
  Hydrocarbon
Insecticides
Synthetic Pine Oil
Wetting Agents
Lubricants
Synthetic Drying Oils
Plasticizers

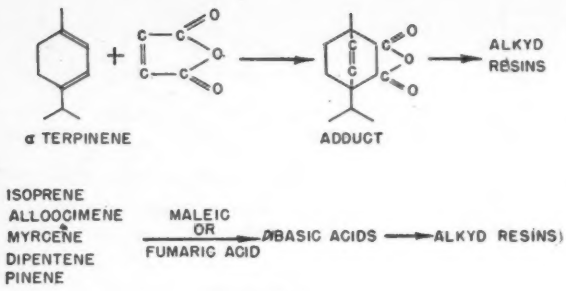

FIG. 7
Terpenes and Maleic Anhydride

terpene sources. However, since benzene and unsaturated petroleum hydrocarbons can be readily oxidized to maleic anhydride, the terpenes do not seem to be an attractive raw material.

If maleic anhydride were available at somewhat lower prices, the extensive use of terpene-maleic resins in the alkyd field might well become a reality. The derivatives of terpene-maleic adducts are shown in Fig. 7.

Hydration and Oxidation Terpenes

When the pinenes are hydrated by acid solutions, terpin hydrate is formed. This can be readily converted to terpineol, the principal constituent of pine oil, and a useful perfume ingredient. Pine oil occurs in the oils in stump wood, but "synthetic pine oil" from turpentine is used to supplement the supplies of the natural product. Pine oil is employed in ore flotation and in textile processing. Terpin hydrate has been recommended as an impregnant to stiffen fibrous products.

Blown turpentine has been suggested as a plasticizer. Oxidized terpenes are said to be useful additives to oil paints, and whatever advantages that may be derived from use of turpentine have been claimed to be due to their presence. It is possible to oxidize the monocyclic terpenes to glycols, some of which are water soluble *(14)*. Apparently, such oxidized products have not achieved any commercial acceptance; however, they could be produced readily if markets were developed. Hydration and oxidation products of the terpenes are shown in Fig. 8.

Wetting Agents

Terpenes are not used in quantities in wetting agents. However, several terpene derivatives have been showing possession of good wetting properties including the sulphonic acid of terpene phenols and the reaction products of some terpenes with sodium bisulphite.

Lubricants

Sulphur compounds are used in extreme pressure lubricants and sulphurized terpenes have been suggested for such uses, as have the reaction products of terpenes with phosphorous pentasulphide *(15)*

Synthetic Drying Oils

It has been noted above that dipinene and other diterpenes possess a moderate tendency to dry. The polymers of alloöcimene and myrcene are more unsaturated and presumably dry more readily. It has been suggested *(26)* to combine alloöcimene and myrcene to linseed or other drying oils to produce improved drying oils.

Terpenes and Formaldehyde

It has been recently shown *(2)* that paratormaldehyde adds to beta pinene to give good yields of a primary alcohol, Nopol. If the reaction is carried out in the presence of acetic acid, the ester is obtained. When the condensation is carried out with aqueous formaldehyde in acid solution, monocyclic alcohols are formed. With prolonged reflux, high-boiling oils are formed *(13)* when sulphuric acid is used as the catalyst. These oils are recommended as plasticizers for polyvinyl chloride.

Conclusions

Present day uses of the terpenes could be considered more thoroughly, and many more uses could be discussed if space permitted. The size of the potential outlets for sulphate turpentine are, it is believed, sufficiently large to consume all the available sulphate turpentine for chemical uses. The composition of sulphate turpentine, containing a few chemical compounds which can readily be separated in a high degree of purity, also suggests its utilization in chemical manufacture.

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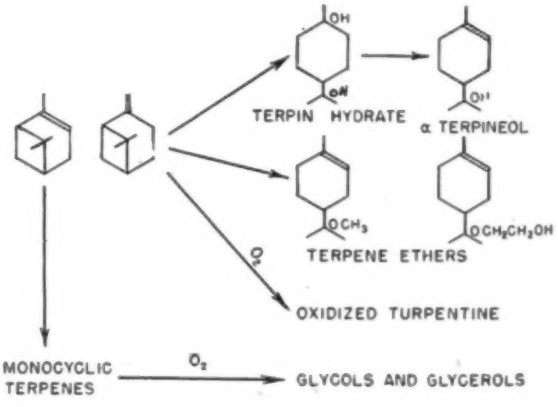

FIG. 8
Hydration and Oxidation of Terpenes

The Butyric Acid Fermentation of Sulphite Waste Liquor*

By Hilda S. Daniels[1] and Joseph L. McCarthy[2]

Abstract

A preliminary investigation has been carried out of the fermentation of sulphite waste liquor sugars to butyric acid by Clostridium polyfermenticum. *Cultural conditions are in part defined. Batch fermentation of steam stripped and neutralized calcium base sulphite waste liquor media diluted with an equal volume of water proceeds readily and removes about 75% of the total initial reducing substances and converts about one half of these to butyric acid in about 72 hours. Continuous fermentation of diluted calcium base sulphite waste liquor gives similar results but in about 10 hours. Undiluted sodium base sulphite waste liquor media is fermented.*

It is the purpose of this paper to report the results of preliminary experiments dealing with the fermentation of sugars in sulphite waste liquor to yield butyric acid.

This fermentation of sulphite waste liquor does not appear to have been quantitatively investigated previously, although Wiley and associates *(1)* have fermented sulphite waste liquor to yield acetone and butanol using *Clostridium butylicum*, an organism similar to those capable of butyric acid type fermentation. However, the mechanism of fermentation of aqueous solutions of pure glucose to yield butyric acid has been studied by Peldan *(2)* whose work has indicated that changes in cultural conditions considerably influenced the course of the fermentation and the nature of the products. While only traces of butyric acid were formed with a phosphate buffer under a nitrogen atmosphere, about 25% by weight yield of butyric acid was produced with a calcium carbonate buffer under a carbon dioxide atmosphere *(2)* and this yield was found to depend upon the concentration of calcium ions in the medium *(3)*. While Peldan found that the presence of sodium sulphite did not influence the yield *(4)*, Neuberg and Arinstein *(5)* have reported that no butyric acid was obtained in fermentation experiments in the presence of sulphite. Arroyo *(6)* has suggested that the presence of ammonium sulphate in fermentation mashes decreases the butyric acid yield by reason of formation of hydrogen sulphide.

The presence of acetic and formic acids in sulphite waste liquor appears to be of possible influence in butyric acid fermentation in view of Osborn's *(7)* finding that the yield of butanol is somewhat increased by addition of acetic acid to a glucose medium being fermented to butanol and isopropanol by *Clostridium butylicum*. Butyric acid added to the fermenting medium was reduced in part to butanol but the yield of acetic acid and isopropanol was increased.

The anaerobic decomposition of sulphite waste liquor solids by microorganism has been studied by Benson, Henry and Partansky *(8, 9, 10)* and pure cultures were isolated of several organisms related on the basis of their biochemical activity to the *Clostridium butyricum* group. One organism isolated was *Clostridium polyfermenticum* which under proper environmental conditions was found to convert sugars of sulphite waste liquor into butyric and acetic acids. Thereby the permanganate oxygen consumption of the liquor was reduced but the Biochemical Oxygen Demand (B.O.D.) remained substantially unchanged unless the acids produced by the fermentation were removed. The organisms were found sensitive to oxygen and were cultivated in media at pH 6.8 in anaerobe jars at room temperature. The presence of an organic source of nitrogen such as peptone, beef extract, asparagine, urea or urine was found necessary for growth.

Experimental

ANALYTICAL METHODS:

Reducing substances were determined by a modification of the Munson-Walker *(11)* method in which the precipitated copper oxide obtained and filtered off in the usual manner, was estimated volumetrically with standard ceric sulphate solution. Results were calculated as glucose.

Butyric and acetic acid analyses of the fermented media were conducted using a modification of the ether partition method for the determination of vola-

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TABLE I.—BATCH FERMENTATION OF GLUCOSE AND SULPHITE WASTE LIQUOR MEDIA

Sample No.	Medium [a]	Reducing Substance Analyses: Before Ferm. g./l.	After Ferm. g./l.	Sugars Fermented g./l.	Sugars Fermented %	Volatile Acid Analyses: Total Vol. Acids Before Ferm. [b] g./l.	Acetic Acid After Ferm. g./l.	Acetic Acid Formed by Ferm. g./l.	Butyric Acid Formed by Ferm. g./l.	Volatile Acids [c]: Acetic Acid %	Butyric Acid %
1	Glucose	9.84	0.0	9.84	100	...	1.02	1.02	2.72	27.2	72.8
2	Glucose	9.84	0.0	9.94	100	...	1.02	1.02	2.72	27.2	72.8
3	Glucose	8.80	0.0	8.80	100	...	0.89	0.89	4.27	17.2	82.8
4	Glucose	8.80	0.0	8.80	100	...	0.94	0.94	3.74	20.0	80.2
	Average	9.35	0.0	9.35	100	...	0.97	0.97	3.36	22.9	77.1
5	SWL	10.7	1.39	9.31	87.0	1.28	2.64	1.36	4.41	23.5	76.5
6	SWL	10.9	1.50	9.40	86.0	1.25	2.65	1.40	4.38	24.0	76.0
7	SWL	10.8	2.48	8.32	77.0	1.21	2.52	1.31	3.88	25.2	74.8
8	SWL	10.6	1.83	8.77	82.7	1.27	2.66	1.39	4.15	25.0	75.0
9	SWL	10.6	2.05	8.55	80.65	1.35	1.79	0.44	4.90	8.2	91.8
10	SWL	10.57	2.0	8.57	81.05	1.35	1.99	0.64	4.63	12.1	87.9
	Average	10.69	1.88	8.82	82.4	1.29	2.38	1.09	4.39	19.7	80.3

[a] See Text for composition of media.
[b] Total volatile acids are calculated as acetic acid.
[c] This data shows the weights formed of acetic and butyric acids per 100 grams of total volatile acids formed.

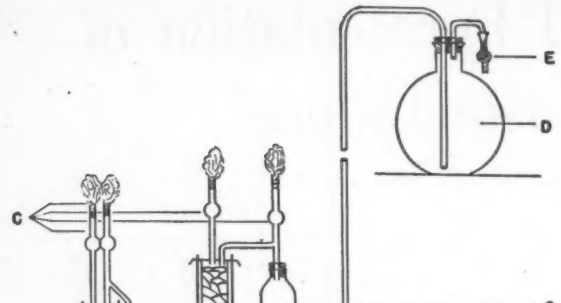

FIG. 1
Diagram of continuous fermentation apparatus

tile acids devised by C. H. Werkman *(12)*. The method was modified to provide for a correction for the sulphur dioxide obtained from the distillation of the acidified medium to separate the volatile acids of fermentation. The sulphur dioxide dissolved in the distillate was found to be removable by a mild oxidation with hydrogen peroxide followed by a second steam distillation, or it could be determined in the distillate by titration with dilute standard iodine before and after ether partitioning and the correction made by calculation. Results on duplicate samples by both methods were in good agreement.

The organism used in this investigation was a pure culture of *Clostridium polyfermenticum* isolated by Partansky and Henry *(10)* and kindly supplied by Dr. E. J. Ordal of the Microbiology Department of the University of Washington.

Cultural conditions were established in preliminary experiments carried out in part by Miss Ernagene Fortescue with a commercial steam stripped calcium base sulphite waste liquor, yeast extract, and C.P. chemicals in small test tubes or 125-ml. Erlenmeyer flasks. Findings indicated that: (a) the organism would grow in sulphite waste liquor, diluted with an equal volume of water, when 0.5% yeast extract and 1% calcium carbonate were present. (b) Sulphite waste liquor steam stripped to about pH 4 was too acidic and it must be neutralized to pH 6.8 to 7.0 prior to its use in media. (c) The addition of asbestos or marble chips to the medium appeared to increase the rate of fermentation as evidenced by rate of gas production. It was possible to ferment successive batches of sulphite waste liquor by aseptically separating the marble chips on which were attached the organisms from the fermented liquor and replacing the latter by fresh, sterile medium. (d) Analyses for concentration of reducing substances in the samples from the previously described successive fermentations, indicated that 70 to 90% of the reducing substances were removed by fermentation. (e) Growth of the organism proceeded with addition of as little as 0.1% yeast extract but the sugar utilization was less complete than when 0.5% was added.

Butyric acid yields were studied by carrying out batch fermentations on samples of diluted sulphite waste liquor medium and also on a nutrient broth, (beef infusion prepared according to the recommendations of the Difco Company Manual) containing 1% glucose. The sulphite waste liquor medium was prepared by neutralizing steam stripped sulphite waste liquor to pH 6.8 with NaOH, and diluting with an equal volume of water. Two per cent $CaCO_3$ and 0.5% yeast extract were added to the diluted sulphite waste liquor samples. The nutrient broth and sulphite waste liquor media were sterilized by autoclaving at 16 pounds pressure for 20 minutes. The flasks were cooled rapidly and inoculated with a 2% inoculum of a vigorously fermenting 20-hour corn mash culture of *Cl. polyfermenticum*. Immediately after inoculation, 20 ml. aliquots of each sample were removed for analysis for volatile acids and reducing substances. The flasks were incubated at 30°C. for 72 hours. Following completion of incubation, aliquots of the fermented media were again analyzed for reducing substances, and butyric and acetic acids. The results obtained are presented in Table I.

CONTINUOUS FERMENTATION EXPERIMENTS:

Apparatus: Two Pyrex glass cylinders (108 cm. by 2.5 cm. and 122 cm. by 2.5 cm.) were filled with pieces of marble about 0.5 to 1 inch in diameter, placed in a vertical position, and assembled with rubber stoppers on top and bottom, glass tubes, and rubber tubes as outlined in Fig. 1. Two gas vents were inserted in the top of the first column, one of them including a bent tee overflow tube leading to the bottom of the second column. The top of the second column was about 14 cm. higher than that of the first column. In this way, the level of the liquid in the first column was maintained above the tee overflow tube and the liquid flow between the two columns was continuous without drawing in air. The second column was also fitted with one calcium chloride tube gas vent and an overflow tube leading to a sample collecting reservoir. A long rubber tube connected to the bottom of this reservoir served to permit removal of the samples.

Sterilization of Apparatus: The apparatus was sterilized as a unit by passing steam through it continuously for 4 hours on three separate days. The usual cotton air filters were replaced by inverted capillary U tubes during the period of steaming since the cotton rapidly became soaked by condensed steam. The air filters, sterilized by autoclaving, were connected in proper places just before turning off the steam.

Preparation of Inoculum: Spores from an infusion agar stab were transferred to tubes of freshly prepared and sterilized 5% corn mash. These cultures were incubated for 24 hours at 30°C and transfers were made to second tubes of freshly heated corn mash. One hundred milliliter quantities of sulphite waste liquor medium diluted with an equal volume of water, and containing 1% $CaCO_3$ and 0.5% yeast extract were prepared in 125-ml. Erlenmeyer flasks. The sulphite waste liquor used had been steam

stripped and neutralized to pH 7 with NaOH before dilution. After sterilization and rapid cooling, the flasks were inoculated with 2 ml. quantities of the above described 24 hour vigorously gassing corn mash culture. The cultures were incubated at 30°C.

Initiation of Fermentation in Columns: The total free volume of the two towers (filled with marble chips) was approximately 800 ml. One liter of sulphite waste liquor medium, diluted with an equal volume of water, and containing 0.5% yeast extract and 1% $CaCO_3$ was prepared. Previously steam stripped sulphite waste liquor was neutralized to approximately pH 7 with NaOH and then diluted with the water. The medium (in a 2-liter Erlenmeyer flask) was sterilized at 16 pounds pressure for 30 minutes. After rapid cooling to about 35°C it was inoculated with the two 100-ml. 24-hour sulphite waste liquor cultures of *Clostridium polyfermenticum.* The inoculated sulphite waste liquor medium was then siphoned through sterile rubber tubing into the columns. The siphon was started by means of an aspirator bulb connected through a $CaCl_2$ tube filled with sterile cotton. The flow rate was adjusted by means of screw clamps so that air was not drawn in from the top of the first column during the filling of the second column. After filling, the columns were allowed to incubate 24 hours before starting the continuous flow of sterile sulphite waste liquor.

Continuous Fermentation: On the following day, the flask of inoculated medium used to fill the columns was replaced by a 4-liter flask filled with sterile medium of the same composition. This reservoir of sterile medium was supported 100 cm. above the top of the columns to provide sufficient head for a uniform flow rate despite change in volume. The siphon was again started by means of an aspirator bulb, and the flow rate controlled by means of a screw clamp.

The fermentation was accompanied by vigorous gas evolution. Foaming occurred but the rate of breaking was sufficiently rapid that no serious difficulties were experienced. The temperature of incubation was approximately 25°C. although it was recognized that this is below that most favorable for the growth of this organism (30-37°C.) and it is very likely that considerably more rapid fermentation could be maintained by use of a controlled higher temperature.

When the liquid level in the flask of sterile medium became low, a fresh flask of medium was aseptically connected to the siphoning apparatus without breaking the siphon or disturbing the rate of flow. While the first and second flasks of medium contained sulphite waste liquor, diluted with an equal volume of water, and containing 0.5% yeast extract and 1% $CaCO_3$, the third flask contained sulphite waste liquor, diluted with only one third of a volume of water, but the same weight of yeast extract and calcium carbonate as in the first two flasks.

Control: The fermented liquor was collected and periodically measured to determine the flow rate. One hundred milliliter samples were taken at intervals and these were analyzed for reducing sugars, volatile acids, and butyric acid and compared with samples of the unfermented liquor from the same batch of medium. The control data and analyses results have been recorded in Fig. 2. Data are summarized in Table II.

Discussion

Initial batch experiments showed (Table I) that *Clostridium polyfermenticum,* the butyric acid-produing anaerobe isolated from sulphite waste liquor by Partansky and Henry *(10),* would grow in steam stripped sulphite waste liquor diluted with an equal volume of water and containing 0.5% yeast extract and 1% calcium carbonate and produce butyric acid yields of 4 to 5 grams per liter in fermentation periods of about 72 hours. About 75 to 80% of the total initial reducing substance, initially present at a concentration of about 10 grams per liter calculated as glucose, was removed and yields of butyric acid amounted to approximately 50% by weight of the sugars fermented.

Continuous fermentation of sulphite waste liquor, diluted with an equal volume of water, by organisms apparently attached to marble chips while the medium flowed slowly through two columns in series (Fig. 1), resulted in similar yields of butyric acid in a fermentation time of about 10 hours compared with about 72

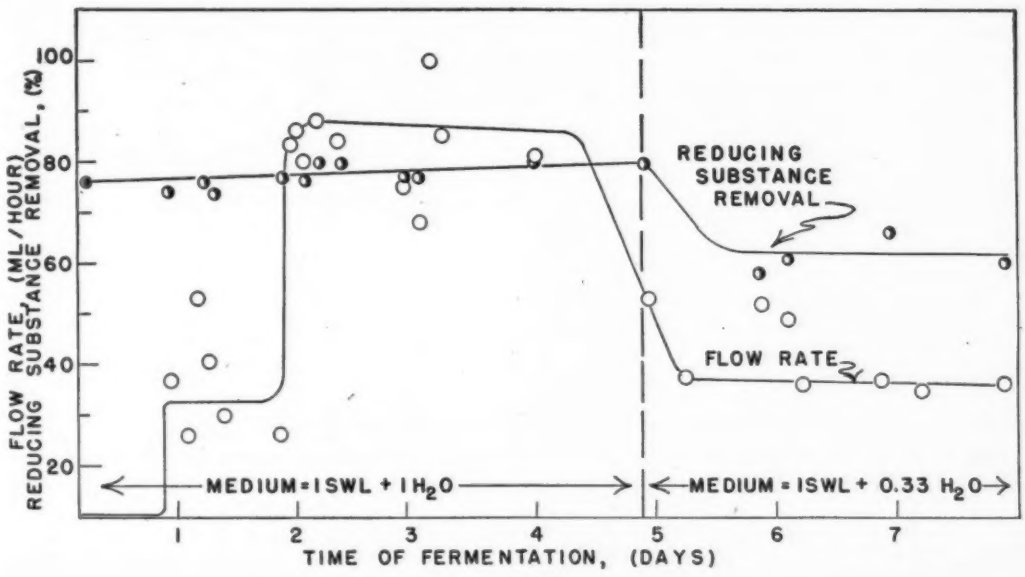

FIG. 2
Control data for continuous fermentation

TABLE II.—SUMMARY OF ANALYTICAL RESULTS OF CONTINUOUS FERMENTATION

Sample	Substances Present in Fermented SWL: Reducing Substances Calc. as Glucose g./l.	Butyric Acid g./l.	Acetic Acid g./l.	Reducing Substances Converted: Decrease in Conc. g./l.	Per Cent of Orig.[a] %	Weight Yield Based on Reducing Substances Converted: Butyric Acid %	Acetic Acid %
C-1[b]	2.55	3.71	2.07	8.15	76.3	45.5	10.5
C-2[b]	5.46	4.10	2.64	10.54	65.9	41.0	7.9

[a] Concentrations in grams per liter of reducing substances and of acetic acid in the unfermented feed liquors were found to be, respectively, as follows: batch A, 10.8, 1.21; batch B, 10.6, 1.21; batch C, 16.0, 1.80. Batches A and B were steam stripped commercial sulphite waste liquor samples diluted with equal volumes of water; batch C was same diluted with 0.33 volumes of water.

[b] Sample "C-1" is a composite of samples collected during the period when the medium being fermented consisted of 1 volume of sulphite waste liquor plus 1 volume of water. Sample "C-2" is same for medium of 1 volume of sulphite waste liquor plus 0.33 volumes of water. See Fig. 2.

hours in the batch systems as shown by the control data given in Table II. About 70% of the original reducing substances were removed and the concentrations of butyric and acetic acids in the fermented liquors were about 4 and 2 grams per liter respectively. With a medium made from 1 volume of sulphite waste liquor diluted with only 0.33 volumes of water, fermentation proceeded, but less readily.

Because of the obvious desirability of continuous processing of at least undiluted sulphite waste liquor, several experiments were carried out to try to ascertain how to proceed so that the liquor may be rapidly and extensively fermented.

Early experiments had shown that while some lots of sulphite waste liquor fermented well when 1 volume was diluted with 0.43 volumes of water, other lots fermented only poorly even when diluted with 1.5 volumes of water. To determine whether these differences arose because of variation in effectiveness of steam stripping, samples of sulphite waste liquor were exhaustively steam stripped until, when tested with yeast by a gasometric fermentation procedure, fermentation proceeded as rapidly as with pure glucose solutions. With *Clostridium polyfermenticum*, fermentation was vigorous when the liquor was diluted with an equal volume of water, and fermentation also occurred although only after a 48 hour lag period when the medium was diluted with 0.33 volumes of water. No growth was obtained in the medium containing undiluted sulphite waste liquor.

Since the presence of heavy metals such as iron is known to inhibit Clostridial fermentations *(13)*, possibly toxic materials were removed by completely deashing sulphite waste liquor with the cation exchange resin Amberlite IR-100. The liquor was then partially neutralized with calcium hydroxide suspension (to pH 2.0) and then thoroughly steam stripped. Results with media prepared from this liquor were no better than those with control samples.

The possible effect of calcium lignin sulphonate in giving rise to a nutritional deficiency in acetone-butanol fermentation of sulphite waste liquor by *Clostridium butylicum* has been recorded by Wiley, Johnson, McCoy, and Peterson *(1)*. They suggested that calcium in sulphite waste liquor may react with added inorganic nutrients, such as phosphate, to bring about their precipitation and thus leave the medium deficient. To avoid precipitation of calcium phosphate, the calcium in a sample of sulphite waste liquor was replaced by sodium using the cation exchange resin Amberlite IR-100 in the sodium cycle. The sodium base sulphite waste liquor was steam stripped and then used in preparation of media. Fermentation experiments with this medium showed that good fermentation was obtained in undiluted sulphite waste liquor although not as vigorous as that observed with glucose controls.

Other experiments were directed toward development of a strain of *Clostridium polyfermenticum* which would grow in undiluted calcium base sulphite waste liquor. Using a culture medium prepared from sulphite waste liquor diluted with 1 volume of water as the inoculum, transfers were made to second batches of calcium base sulphite waste liquor media diluted with 0.33 volumes of water, and with no water. After 48 hours, growth was vigorous in the former case, but was not observed in the latter. However after a week of incubation, growth was also observed in the flasks of undiluted sulphite waste liquor medium. Thus culture was maintained by transfers on undiluted calcium base sulphite waste liquor for a month without showing any signs of decreased activity. Qualitatively, as indicated by the odor of the acidified fermented liquor, butyric acid was produced but in this case no quantitative determinations of butyric acid yields or fermentation efficiencies were carried out.

Summary

1. In preliminary experiments, sugars in diluted calcium base sulphite waste liquor have been fermented by *Clostridium polyfermenticum* to yield butyric and acetic acids by batch and continuous flow methods. When the liquor was diluted with an equal volume of water and fermented in a continuous flow apparatus, about 70% of the original reducing substances were consumed and yields of butyric acid amounted to about 40 to 45% by weight of the sugars converted.

2. Undiluted sodium base sulphite waste liquor media has been fermented by *Clostridium polyfermenticum*.

Acknowledgement

The authors appreciate the aid of Miss Ernagene Fortescue in carrying out early experiments. They are also grateful for the suggestions kindly given by Dr. Q. P. Peniston of Pulp Mills Research, and by Drs. H. C. Douglas and E. J. Ordal of the Microbiology Department, University of Washington.

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